PUMP HOUSE

PLANT No. 1

PLANT No. 2

56'-3" (N.T.S.)

112'-7½"

PX 582.

Universal Oil Products Company
Chicago, Illinois

List of Standard Dubbs Cracking Units
Constructed to June 1, 1926

Licensees Licensees: United States	Refinery	Number of Units Units Built for Gravity Feed	Units Built With High Dephlegmator and Forced Feed	Total
American Refining Company	Wichita Falls, Texas	4		4
Arkansas City Refining Company	Arkansas City, Kansas	2	2	4
Arro Oil & Refining Company	Lewistown, Montana		1	1
Associated Oil Company	Avon, California	1		1
Ashland Refining Company	Catlettsburg, Kentucky		1*	1
Derby Oil Company	Wichita, Kansas	4		4
Freedom Oil Works Company	Coraopolis, Pennsylvania	1		1
Grayburg Oil Company	San Antonio, Texas	2		2
Great Southern Refining Company	Pryse, Kentucky		2	2
Houston Oil Company of Texas	Camden, Arkansas	2		2
Imperial Refining Company	Ardmore, Oklahoma	4		4
Indian Refining Company	Lawrenceville, Illinois	4		4
Interocean Oil Company	Baltimore, Maryland	2		2
Johnson Oil & Refining Company	Cleveland, Ohio	4		4
Kendall Refining Company	Bradford, Pennsylvania	2		2
Kettle Creek Refining Company	El Dorado, Arkansas		2	2
Louisville Refining Company	Louisville, Kentucky		2	2
New Orleans Refining Company	Sellers, Louisiana	2	2	4
Ouachita Valley Refining Company	El Dorado, Arkansas	1		1
Panhandle Refining Company	Wichita Falls, Texas	2		2
Producers & Refiners Corporation	Parco, Wyoming	10		10
Producers & Refiners Corporation	West Tulsa, Oklahoma	4		4
Prudential Oil Corporation	Baltimore, Maryland	4		4
Pure Oil Company	Ardmore, Oklahoma	4		4
Root Refining Company	El Dorado, Arkansas		2	2

Roxana Petroleum Corporation	Arkansas City, Kansas	6	2*	8
Roxana Petroleum Corporation	Wood River, Illinois	6	8-4*	14
Shaffer Oil & Refining Company	Cushing, Oklahoma	4		4
Shell Oil Company	Martinez, California	1	8*	9
Shell Oil Company	Wilmington, California		8	8
Shreveport Producers & Refiners Corp.	Shreveport, Louisiana	2		2
Texas Pacific Coal & Oil Company	Wynnewood, Oklahoma	2		2
Texhoma Oil & Refining Company	Wichita Falls, Texas	4		4
Vickers Petroleum Company	Potwin, Kansas	2		2
Waite-Phillips Company	Wichita, Kansas	4		4
Warner-Quinlan Company	Warners, New Jersey	2		2
White Star Refining Company	Wood River, Illinois	2	1	3
Total—United States		94	41**	135
Licensees: Foreign Countries				
Astra Romana S.A.	Ploesti, Roumania		1*	1
De Bataafsche Petroleum Maatschappij	Balik Papan, Borneo, D.E.I.	2	4*	6
De Bataafsche Petroleum Maatschappij	Tjepoe, Java, D.E.I.		1*	1
Curacaosche Petroleum Maatschappij	Curacao, D.W.I.	2		2
John Fell Company	Sydney, Australia		1	1
Nippon Oil Company	Yokohama, Japan	1	1	2
Omnium International de Petroles	Cernavoda, Roumania		1*	1
Trinidad Leaseholds, Ltd.	Pointe-a-Pierre, Trinidad, B.W.I.		2*	2
Total—Foreign Countries		5	11***	16
Summary				
Total: United States		94	41	135
Total: Foreign Countries		5	11	16
Grand Total		99****	52	151

* Units under construction

United States	15	(All 15 units went into operation within the following six months)
Foreign Countries	9	(Two units went into operation within the following six months)
	24	(17 went into operation within the following six months)

** 39 Of these units had 12 additional tubes in the heater. (62 tubes)

*** 10 Of these units had 12 additional tubes in the heater. (62 tubes)

49

**** 65 Of these units had been equipped with hot oil pumps by June 1, 1926.

PX 582.

1815

2708 PX 583.

Dubbs Cracking Process

Run No.	90	Roxana Unit No. 2—Arkansas City, Kansas
Pressure	200	
Type Installation		10'x30' Chamber—B. J. Reflux Pump
Type Feed		Overhead
Hours on stream		881
Days on stream		36.7
Charging Stock		
Avg Gr 1° Bé		34.8
Avg % at 410 Engler		——
Avg % at 572 Engler		43.6
Total Bbls.		29,963
Bbls/day		816
R. D. Produced		
Total Bbls.		22,194
Bbls/day		604
Avg Gr 1° Bé		51.3
Recirc/produced		Negligible
% 410 Hemple		62.5
Bbls 410 Hemple Gasoline Total		13,890
Bbls/day		378
Yields		
P. D.—% R. O.		74.07
410 Hemple Gasoline—% R. O.		46.37
Residuum		
Avg Gr—° Bé		16.5
% Solids by Benzol		2.5
Coke		
Tons		50.4
#/Bbl. R. O.		3.65
Fuel		
Liquid—% R. O.		2.99
Gas		Burned but not measured
Temperatures		
Furnace—above tubes		1519
Transfer		879
Vapors to Dephlegmator		821
Vapors to Condenser		562

2709 PX 584.

Universal Oil Products Co.

Dubbs Cracking Process
Arkansas City Refining Company
Plant No. 2

Summary of Operations

Run No. 4-B
Date: March 16, 1925
Hours on stream 687: (28.62 days) Ending 2 A. M. 4-14-25
Pressure, Pounds—200
Type Installation: Standard gravity feed plant—Bubble trays in dephlegmator.
Type Operation: Residuum—direct feed—high gravity distillate.
Charging Stock: Gas Oil—5.2% 410 Engler—49.9% 572 Engler

		Total Bbls.	Bbls. per day	% of R.O.	Be. Gr.
		14,175	495		34.4
Results of Cracking					
Pressure Distillate		8391	293	59.2	54.1
Residuum (Estimated)		5189	181	36.6	25.2
% Solids by Bensol (Composite)	.8				
Uncondensable Gas & Coke (Estimated)		595	21	4.2	
Tons Coke Produced	16.18				
Lbs./Bbl. of R. O.	2.28				
Fuel Consumption					
Liquid—% of R. O.	(Average)				
"Total"—	(for 23)				
"On stream" to	(days)				
"Fires out"	8.8				
Gas—					
Avg. Cu. Ft./Hour	(Not measured)				
No. hours burned	(Not measured)				
Cu. Ft. Gas/Gal. Gasoline	(Not measured)				

Results Distilling Pressure Distillate (Lab)

	Total Bbls.	Bbls. per day	% of R. O.	% of P. D.	Be. Gr.
Gasoline (437 Engler)	6855	240	48.36	81.7	
Gas Oil (P. D. Bottoms)	1117	39	7.8	13.3	
Dist. Loss	419	15	3.0	5.0	

Temperatures (Average)	
Furnace—above tubes—	1414
Furnace—below tubes—	966
Transfer—	830
Vapors to Dephlegmator—	789
Vapors to Condenser—	531
Combined Feed—	741

Readings are by meter and are corrected as
R. O. meter— 3% high
P. D. meter—12% high
(Overall figures—R. O. and P. D. from time on stream to time fires out are used)

2710 PX 585.

Cracking Plant Operation
Universal Oil Products Co.
Chicago, Ill.

Plant No. 1 & 2 — Licensee Waite Phillips Co.
Run No. One — Location Wichita, Kans.

	1	2
Date and Time Fired	1:00 P.M. 3-8-25	1:00 P.M. 3-10-25
Date and Time on Stream	1:00 A.M. 3-9-25	1:00 P.M. 3-11-25
Date and Time Fires Out	3:00 A.M. 4-1-25	3:00 A.M. 4- 3-25
Hours Cleaning Time		

Type of Oil Gas Oil Pressure 150#-160# Coke Tons.....

Summary of Operations

1084 Plant Hours Ending ..... 1924.
45.17 Plant Days

	Total Bbls.	Bbls. Per Day Per Unit	% of Raw Oil	% of Press. Dist.	Be. Gr.	IBP*EP
Raw Oil (By Gauge)	18541	410	100		35.0	
Press Dist. (By Gauge)	11767		63.40		50-52	
Residuum (By Gauge)	5791		31.25		24.5	
Unc. Gas & Carbon	983		5.35			
Cut Gasoline	7422		40.57	64	58.0	
Gas Oil						
Distillation Loss						
Fuel Oil Burned						

2711 PX 586.

Universal Oil Products Company
310 South Michigan Avenue
Chicago

Number of Licensees, Operating Units and Reported Thruput for Years 1922 to 1929, Inclusive

Year	Number of Licensees	Number of Units as of Dec. 31st	Reported Thruput Barrels	Reported Thruput Gallons
1922	1	2	38,564	1,619,688
1923	20	71	2,143,791	90,039,222
1924	26	95	8,912,303	374,316,726
1925	35	109	14,509,342	609,392,364
1926	41	153	24,764,696	1,040,117,232
1927	47	183	28,782,275	1,208,855,550
1928	51	200	49,670,165	2,086,146,930
1929	49	214	61,589,905	2,586,776,010
Totals			190,411,041	7,997,263,722

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Universal Oil Products Company
Chicago, Illinois

Estimated Cost of Existing Dubbs Cracking Units and Those Under Construction
as of December 31, 1929

Estimate No. 462

Licensee	Refinery	No. of Existing Units	No. of Units Under Construction	Total No. Units	Estimated Cost of Existing Units	Estimated Cost of Units Under Construction	Total Estimated Cost of Units Existing and Under Construction
Licensees: United States							
Allegheny-Arrow Oil Company	Canton, Ohio		1	1		$ 165,000.00	$ 165,000.00
American Refining Properties	Wichita Falls, Texas	1		1	110,000.00		110,000.00
Arro Oil and Refining Company	Lewistown, Montana	1		1	148,000.00		148,000.00
Ashland Refining Company	Catlettsburg, Ky.	1		1	170,000.00		170,000.00
Barnsdall Refineries, Inc.	Wichita, Kansas	4		4	330,000.00		330,000.00
Bell Oil and Gas Company	Grandfield, Okla.	1		1	150,000.00		150,000.00
Continental Oil Company	Baltimore, Md.	4		4	360,000.00		360,000.00
Continental Oil Company	Ponca City, Okla.	6		6	1,400,000.00		1,400,000.00
Continental Oil Company	Wichita Falls, Texas	4		4	500,000.00		500,000.00
Derby Oil Company	Wichita, Kansas	4		4	500,000.00		500,000.00
Empire Oil & Refining Company	Gainesville, Texas	2		2	465,000.00		465,000.00
Empire Oil & Refining Company	Ponca City, Oklahoma	2		2	470,000.00		470,000.00
Freedom Oil Works Company	Coraopolis, Pa.	1		1	115,000.00		115,000.00
Grayburg Oil Company	San Antonio, Texas	2		2	230,000.00		230,000.00
Houston Oil Company of Texas	Camden, Arkansas	2		2	258,000.00		258,000.00
Imperial Refining Company	Ardmore, Oklahoma	4		4	375,000.00		375,000.00
Independent Oil and Gas Company	Kansas City, Kansas	1		1	325,000.00		325,000.00
Independent Oil and Gas Company	Okmulgee, Oklahoma	1		1	325,000.00		325,000.00
Indian Refining Company	Lawrenceville, Ill.	4		4	390,000.00		390,000.00
Johnson Oil Refining Company	Cleveland, Oklahoma	4		4	450,000.00		450,000.00
Kendall Refining Company	Bradford, Pa.	2		2	200,000.00		200,000.00
Kettle Creek Refining Company	El Dorado, Arkansas	2		2	225,000.00		225,000.00
Louisville Refining Company	Louisville, Kentucky	2		2	190,000.00		190,000.00
Ouachita Valley Refining Company	El Dorado, Arkansas	1		1	125,000.00		125,000.00
Panhandle Refining Company	Wichita Falls, Texas	2		2	200,000.00		200,000.00
Paragon Refining Company	Toledo, Ohio	2		2	440,000.00		440,000.00
Peansoil Company	Oil City, Pa.	2		2	375,000.00		375,000.00
Producers and Refiners Corporation	Parco, Wyoming	6		6	950,000.00		950,000.00
Producers and Refiners Corporation	West Tulsa, Oklahoma	6		6	700,000.00		700,000.00
Pure Oil Company	Ardmore, Oklahoma	4		4	375,000.00		375,000.00

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PX 587.

Root Refining Company	El Dorado, Arkansas	2		2	250,000.00		250,000.00
Shaffer Oil & Refining Company	Cushing, Oklahoma	5		5	500,000.00		500,000.00
Shell Oil Company	Dominguez, California	8		8	1,700,000.00		1,700,000.00
Shell Oil Company	Martinez, California	9		9	1,133,000.00		1,133,000.00
Shell Oil Company	Wilmington, California	8		8	1,000,000.00		1,000,000.00
Shell Petroleum Corporation	Arkansas City, Kansas	10		10	1,250,000.00		1,250,000.00
Shell Petroleum Corporation	East Chicago, Ind.	8		8	2,150,000.00		2,150,000.00
Shell Petroleum Corporation	Houston, Texas		6	6		1,600,000.00	1,600,000.00
Shell Petroleum Corporation	Sellers, La.	6		6	1,510,000.00		1,510,000.00
Shell Petroleum Corporation	Wood River, Illinois	16		16	1,500,000.00		1,500,000.00
Shreveport-El Dorado Pipe Line Co., Inc.	Shreveport, La.	2		2	200,000.00		200,000.00
Standard Oil Co. of California	El Segundo, Cal.	8		8	3,500,000.00		3,500,000.00
Standard Oil Co. of California	Richmond, California	8		8	3,500,000.00		3,500,000.00
Texas Pacific Coal and Oil Company	Wynnewood, Oklahoma	2		2	185,000.00		185,000.00
Vickers Petroleum Company	Potwin, Kansas	2		2	190,000.00		190,000.00
White Star Refining Company	Trenton, Michigan	2		2	400,000.00		400,000.00
White Star Refining Company	Wood River, Ill.	3		3	360,000.00		360,000.00
H. F. Wilcox Oil and Gas Company	Bristow, Oklahoma	1		1	225,000.00		225,000.00
Total—United States		178	7	185	$30,404,000.00	$1,765,000.00	$32,169,000.00
Licensees: Foreign Countries							
Anglo-Egyptian Oilfields, Ltd.	Suez, Egypt		1	1		370,000.00	370,000.00
Anglo-Persian Oil Company, Ltd.	Llandarcy, Wales	1		1	275,000.00		275,000.00
Astra Romana Societate Anonima	Ploesti, Roumania	5		5	1,000,000.00		1,000,000.00
Belgian Cracking Company	Langerbrugge, Belgium	1		1	120,000.00		120,000.00
B.E.N.I.T.-Societa Anonima Benzine Italiana	Naples, Italy	1	1	2	170,000.00	220,000.00	390,000.00
British-American Oil Refineries, Ltd.	Toronto, Canada	2		2	335,000.00		335,000.00
Burmah Oil Company, Ltd.	Rangoon, India	1		1	300,000.00		300,000.00
Columbia Soc. Franco Roumaine de Petrole	Ploesti, Roumania	1		1	175,000.00		175,000.00
Columbia Soc. Franco Roumaine de Petrole	Cernavoda, Roumania	1		1	150,000.00		150,000.00
Compania Mexicana de Petroleo "El Aguila" S.A.	Minatitlan, Mexico		1	1		375,000.00	375,000.00
Curacaosche Petroleum Industrie Mij.	Curacao, D.W.I.	6	8	14	825,000.00	2,575,000.00	3,400,000.00
DeBataafsche Petroleum Maatschappij	Balik Papan, Borneo, D.E.I.	8	2	10	1,000,000.00	275,000.00	1,275,000.00
DeBataafsche Petroleum Maatschappij	Tjepoe, Java, D.E.I.	1		1	150,000.00		150,000.00
Diadema Argentina Soc. Anon. de Petroleo	Buenos Aires, Argentina		4	4		1,250,000.00	1,250,000.00
Nippon Oil Company, Ltd.	Yokohama, Japan	2		2	250,000.00		250,000.00
Societa per l'Industria Italiana del Petrolio	Spezia, Italy	2		2	500,000.00		500,000.00
Steaua Romana Soc. Anon. pour l'Industrie de Petrole	Campina, Roumania	2	1	3	460,000.00	390,000.00	850,000.00
Trinidad Leaseholds, Ltd.	Pointe-a-Pierre, B.W.I.	2	2	4	250,000.00	850,000.00	1,100,000.00
Total—Foreign Countries		36	20	56	$ 5,960,000.00	$6,305,000.00	$12,265,000.00
Summary:							
Total: United States		178	7	185	$30,404,000.00	$1,765,000.00	$32,169,000.00
Total: Foreign Countries		36	20	56	$ 5,960,000.00	$6,305,000.00	$12,265,000.00
Grand Total		214	27	241	$36,364,000.00	$8,070,000.00	$44,434,000.00

PX 587.

1821

Universal Oil Products Company
Chicago, Illinois

The Following Dubbs Cracking Units Were Partially or Completely Dismantled

Licensees United States:	Location	No. of Units	Estimated Cost
American Refining Properties	Wichita Falls, Texas	3	$ 300,000.00
Arkansas City Refining Company	Arkansas City, Kansas	4	385,000.00
Associated Oil Company	Avon, California	1	110,000.00
Inter Ocean Oil Company	Baltimore, Maryland	2	170,000.00
Shell Petroleum Corporation	Sellers, Louisiana	2	190,000.00
Warner Quinlan Company	Warners, New Jersey	2	230,000.00
Foreign:			
John Fell and Company, Ltd.	Sydney, Australia	1	120,000.00
Total		15	$ 1,505,000.00
Dubbs Cracking Units existing and under construction		241	44,434,000.00
Grand Total		256	$45,939,000.00

Chicago, Illinois
June 18, 1932

PX 587.

PX 597

Twelfth Inn.
Test of July-19-1919 Sheet # 1

July 19-1919

Time	Refer to drawing 233 to explain letters. 4" Furnace, Stack & Air Duct Temperatures. 4" Furnace Temperatures. "A" W.End	"A" E.End	"B" E.End	"C" E.End	"D" C.End	"D" S.End	Stack Breeching	Atmospheric Temp.	Oil Temperatures. 10" in charge	4" Side charge	Water Temperatures. Vertical Lower	Top	Delph	Water reading	Gal.	Pr.	4 A.M. C	Gal.	Pr.	Water reading	Gal.	400 B.H.P.	Be.
12:00																							
3:00																							
6:00																							
9:00								84															
12:00	778	810	620	680			466	80	190	360													
July 20																							
3:00	1270	1320	800	760			610	76	450	630													
6:00	1460	1540	880	900			710	74	610	530	100												
9:00	1560	1685	960	990			760	72	660	610	560			390	56	50							
12:00	1650	1710	1020	1040			810	70	730	710	630			704	130	96							

Totals

Signature of Operators	Time Shift	Date.	Fuel Pumping Plant	Ft.	In.	Time	Date.
L.O. McNally	8AM To 11PM	7-19-19					
E. Treiner	" " " "	"					
Glen E. Tate	11-3 PM To 7 A.M.	7-20-19					
Jon Rochie							
J.R. Short	7 AM To 3 PM	7-20-19					
L.C. Estes	" "						

Contents	Tank No.	Ft.	In.	Time	Date.
19th				Gauges Upon Changing	
	120	0	1½	5 P.M. July	19-1919
Fuel Oil	121	8	11½	" "	" "
Fuel Oil	122	8	11½	" "	" "
Fuel Oil	123	0	2	" "	" "
	5				
	6				
	7				
	8				
	9				
	10				
	11				
	12				

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1823

Twelfth run
Test of July 19 Second heat of Sheet 1

31.9 Be. Gr. Gas Oil from Mid-Continent Crude.

Time	Distillate taken off Laboratory Test. Meter Reading	Gal drawn off	Be. 400 F.	Reflux Distillate Be. 400 F.	4" Coil flash vapor into 16" Be. 400 F.	Bottom Vertical Pipe Condenser Be. 400 F.	Pressure Gauge Pressure Pounds per square inch	Steam Steam to Atomizing Nozzles Pounds per square inch	Steam Steam to Furnaces
July 19									
12:00									
3:00									
6:00									
9:00 PM	5622.5								
12:00	"			12					
July 20									
3:00	"			13					
6:00	"			13					
9:00	"								
12:00									

Time	Gal Bottom of 4" Separator Refluxed Be. 400 F. %	Be.	Flue Gas Analysis Percent CO2	O2	CO	Combined Feed to 4" Coil Be. 400 F.	Combined Reflux of 4" Coil Be. 400 F. %	Be.	Proportion of Reflux to Oil Feed
12:00									
3:00									
6:00									
9:00									
12:00									
3:00									
6:00									
9:00									
12:00									

Time	Pipe Meter Gal Net Reading	4" Coil Coil Gal Per Hour 1	2	3	4
11:04 2	4976.4	1572.44	703.87	144.79	
	5078.2	5784.2	805.2	244.22	
	5200.11	1692.56	825.46	269.74	
11:24 2	5301.87	1792.32	913.20	253.05	
	5401.2	1871.97	1011.72	256.6	
	5502.2	1972.62	1112.2	256.6	

1825

Twelfth Run.
Test of . 7-19-19

Be. Gr. Gas Oil from
Mid-Continent Crude.
IMPROVED HOUSE PLANT NO. 2.

Time	Refer to drawing 233 to explain letters. 4" Furnace, Stack & Air Duct Temperatures.								Oil Temperatures.					Vapor Temperatures.				New Oil Consumed "A"						Residuum Drawn from 10" Coil "B"					
	4" Furnace Temperatures.						Stack	Atmospheric Temp.	10" Discharge	4" Discharge	Reflux			Aerial				Meter Reading	Gal.	Be.	400 S. P.			Meter Reading	Gal.	400 S. P.			
	"A" N.End	"A" S.End	"B" S.End	"B" S.End	"C" N.End	"C" S.End					G	H	Pump J	K Lower	L Top	Liquid					%	Gal.	Be.				%	Be.
12:00	1555	1560	1095	1100			825	78	720	850	630			700	132	90													
3:00																													
6:00																													
9:00																		13,730	399										
12:00	1554	1549	750	750			720	77	740	860	640			710	200	150		13,731	407					50	5	330	2	22.6	
3:00																													
3:00	1548	1552	775	775			825	74	745	870	660			710	190	130		138092	375					50	5	334	2	22.9	
6:00	1549	1560	1200	950			720	70	745	860	660			700	200	150		138458	366										
9:00																													
12:00																											2.2	20.9	

Totals

Signature of Operators. Time Shift Date. Fuel Pumping Plant Ft. In. Time Date.

Last Gauge @ 12 22 P.M
7-20-19.

Contents	Tank No.	Ft.	In.	Time	Date.
	1				
	2				
	3				
Crude	200	0	11½	12 noon	July 20-19
Test	201	0	1	"	"
Gas Oil	202	7	134	"	"
Residuum	203	0	3	"	"
	1				
	2				
	3				
Crude	200	0	11	12 M	JUL 21 1919
Test	201	1	46		
Gas Oil	202	6	9		
Residuum	203	0	11		

1827

81/4 Bo. Gr. Gas Oil From
Mid-Continent Crude.
Test No. 2.

Test of July 1919 Second Sheet of Sheet # 2

Time	Distillate taken off Laboratory Test. Meter Reading	Sol	Bo. 400 F. °			Reflux Condensate Thermometer		4" Diagram into 10" Coil. Bo. 400 F. °			4 Pass Spiral Condenser Bo. 400 F. °			Uncondensed Gas Meter Reading.	4" Coil Fuel Gas Meter. 1	2	3	4	Pressure Pounds per square inch	Draft. Stack inches of water	Front of Furnace
July 30																					
10:00	1234													1102.31	867260	378567	819423	260684	100	.02	16
5:00																					
6:00	4677#	917	42.5	56.8				54.6	6.4	—	34.6	10	55.4		876032	382188			120	.02	17
9:00																					
10:00	0284	222	49.4	50.6				38.5	7.5	—	33.0	12	45.5	112176	883568	387122	831946	271671	130	.02	19
July 31																					
2:00	5843	209	50.4	49.6				10.1	5	—	25.4	14	48.6	112380	887520	394870	838760	276394	130	.02	20
6:00	5761	3.52	49					12		—	37.1	12	48.9	112580	894361	392202	837469	275844	130	.02	20
9:00																					
10:00		2.40	47.9	52.2		35.6		29.1	5	—	25.0	15	45.3	112801	899242	397246	842621	278621	130	.02	18

3550 32022 22369 23941 18947

Cu ft natural Gas used 97,269
Cu ft Illuminating gas 3550

Time	Portion of U. Cond. Distillate Refluxed. Bo. 400 F. °			Flue Gas Analysis percent CO2	O2	CO	Combined Feed in 4" Coil. Bo. 400 F. °			Combined Reflux in 4" Coil. Bo. 400 F. °			Proportion of Reflux to Oil Feed.
12:00													
3:00													
6:00	4	37	52.8				42.7	4	—				
9:00													
12:00	45.7	42.3	55.2				30.2	5.6	—				
3:00	42.1	50.4	55.6				10.8	5.6	—				
6:00													
9:00													
12:00	545.3	14.7	54				29.0	11.5	—				

1829

Test No.
Test of July 19, 1919. Sheet # 3

Time	Bottom of 1st Separation followed			Top Gas Analysis percent.			Combined Feed in 4" Coil			Condition in 4" Coil.			Proportion of Return to Oil Feed.
	lb.	Gravity	Deg.	CO2	Oxygen	CO	lbs.	Gravity	Deg.	lbs.	Gravity	Deg.	
10:00													
11:00													
12:00													
1:00													
2:00													
3:00													
4:00													
5:00													
6:00													
7:00													
8:00													
9:00													
10:00													

| Time | | | | | | | | | | | | |

31.9 e. Gr. Gas Oil from Mid-Continent Crude.
IMPROVED DU S PLANT NO. 2

Twelfth Run
Test of July 19, 1919. Sheet # 3

Time	Refer to drawing 233 to explain letters. 4" Furnace, Stack & Air Duct Temperatures. "A" N.End	"A" W.End	"B" E.End	"B" E.End	"C" S.End	"C" S.End	Stack Breech	Atmospheric Temp.	Oil Temperatures F 10"Dis charge	F 4"Dis charge	Reflux O	Reflux H	Pump	Vapor Temperatures. Aerial K Lower	Aerial I Top	H Delph	Raw Oil Consumed "h" Meter Reading	Cal.	Be.	400 B.P. %	400 B.P. Cal.	400 B.P. Be.	Residuum drawn from 10" Coil "h" Meter Reading	Cal.	400 B.P. %	400 B.P. Be.
12:00																										
3:00																										
6:00																										
9:00																										
12:00	1562	1522	970	970			820	72	735	850	655			655	270	150	142742	372					5x104	1044	22	14.6
3:00																										
6:00							800	68	740	840	640			650	230	130	141652	390					5x272	189	24	19.2
9:00	1550	1520	970	970			810	65	725	840	650			650	270	150	142018	366					14357	69	2	21.9
12:00																										

Totals

Signatures of Operators Time Shift Date. Fuel Pumping Plant Ft. In. Time Date. Contents Tank No. Ft. In. Time Date

Lon Backus

JUL 22 1919

Tank No.	Ft.	In.	Time	Date
#1				
#2				
#3				
#20				
#21				
#22				
#23				
#1				
#2				
#3				
#20				
#21				
#22				
#23				

1833

Re. Gr. Gas Il From Mid-Continent Crude.
IMPROVED DUBBS PLANT NO. 2.

Twelfth Run.
Test of [illegible]

Time	Refer to drawing 233 to explain letters. 4" Furnace, stack & Air Duct Temperatures.								Oil Temperatures.					Vapor Temperatures.			Raw Oil Consumed			"B"			Residuum drawn from 10" Coil "B"			
	4" Furnace Temperatures.						Stack Breeching	Atmospheric Temp.	"E" 10" Discharge	"F" 6" Discharge	Well x			Aerial			Meter Reading	Gal.	Be.	400 B.P.			Meter Reading	Gal.	400 B.P.	
	"A" N.End		S.End	"B" S.End	"C" S.End	"C" N.End					G	H	Pump J	K Lower	L Top	M Delph				S	Gal.	Be.			S	Be.
12:00																										
3:00																	193637	3 50								
6:00																		2 32								
9:00																		3 73								
12:00								72										3 96								
2?																										
3:00																		4 91								
6:00																		3 64								
9:00																		3 64								
12:00																		3 63								

Totals

Signature of Operators Time Shift Date.

Fuel Pumping Plant. Ft. In. Time Date.

Pumped Gas Oil from Tank #1
to Tank #22 6 pm. 22nd
Gauge #1 before pump 9' 9½
after pump 3' 4½
6' 5"

Contents Tank No. Ft. In. Time Date.

#1				
#2				
#3				
#20				
#21				
#22				
#23				

#1				
#2				
#3				
#20				
#21				
#22				
#23				

1895

Twelfth Run.
July 19th, 1919

Sheet # 4

31.9 Be. Cr. Gas O il From Mid-Continent Crude.
IMPROVED DUBBS PLANT NO:2
8 SCONT UNIT.

Time	Distillate taken off Laboratory Test. Meter Reading	Gallons from off	Be.	400 F.	Gals.	Be.	Reflux Distillate Be.	400 F.	Be.	4" Coil 1 inch area into 10" Spiral Condenser Be.	400 F.	Be.	Bottom Serial Condenser Be.	400 F.	Be.	Uncondensable Gas Meter Reading	4" Coil Dual Gas Meter #1	#2	#3	#4	Pressure Pounds per square inch	Draft. Stack Breeching	Front End Furnace
12:00	633.61	1.49														112160	12 2112	12 2242	8 4165	29 1677	130	.22	.17
1:00	644.76	23.45	46.5	48 1/2		54.4				29.7	5 1/4	—	31.8	17	49.6	1 18460	12 2335	12 3620	8 4328	29 1837	130	.22	.17
2:00	647.20	2.44	46.6	48		54.4				29.7	4 3/4	—	32.8	16 1/2	49.3	1 18820	12 2442	12 3750	8 4396	29 2052	130	.22	.17
3:00	649.60	2.40	46.4	48.2		54.2				29.6	5	—	32.5	16 1/2	49.0	1 18891	12 2510	12 4177	8 4407	30 0125	130	.22	.19
4:00	652.20	2.60	45.4	48		54.2				29.6	5 1/4	—	32.5	16 1/2	49.0	1 19236	12 2590	12 4603	8 4604	30 0296	130	.22	.20
5:00	654.81	2.61	45.2	47.8		54.0				29.6	4 1/2	—	32.7	16 1/2	49.2	1 20300	12 2712	12 4983	8 5514	30 0385	130	.22	.21
6:00	657.18	2.37	45.9	48.6		54.8				29.6	4 3/4	—	32.3	16 1/2	49.2	1 20900	12 2782	12 5183	8 5724	31 1378	130	.22	.20
7:00	659.05	1.87	46.1	48.6		54.8				29.7	4 3/4		32.3	15 1/2	49.2	1 21232	12 2846	12 5522	8 5486	31 1768	130	.23	.20
8:00	661.34	2.29	44.7	50.3		56.7				29.4	5	—	32.3	15 5	51.2	1 21102	12 2947	12 5762	8 5760	31 2369	130	.23	.20
			46.5	47.3		54.4										3442	2208	27761	2 2105	19 1 7			

Time	Bottom of Vaporator Refluxed Be.	400 F.	Be.	Fuel Gas Analysis Percent C.O.	Gas	Gas	Combined Feed to 4" Coil Be.	400 F.	Be.	Combined Reflux to 4" Coil Be.	400 F.	Be.	Proportion of Reflux to Oil Feed.
12:00													
1:00	49.7	1.93	54.9				32.7	5	—				
2:00	49.7	1.43	54.2				32.4	4 3/4	—				
3:00	49.7	1.4	54.4				32.2	4	—				
4:00	49.0	1.63	54.3				32.2	4 1/2	—				
5:00	48.4	1.85	53.7				32.3	4 1/2	—				
6:00	47.8	1.5	53.2				32.3	4	—				
7:00	Over Run						32.3	3.5					
8:00	-	-	-				32.1	3.5					
							32.0	4.0	—				

1837

Twelfth Run
Test of July 20th, 1920.

JUL 21 19

Sheet #5

Time	Refer to Analysis (A) to explain letters & Furnace Temperatures						Stack Temp.	Stack-Draft	10"	12"	Vapor Temp.	Water			
July 23	A	B	C	D	E	F									
	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6									
12:00			930	940			800	92							
6:00		1520	930	930			800	92							
0:00			930	930			800	105	735	745	615				
6:00	1530	1520	930	940			790	84	730	740	610				
12:00	1530	1540	940	940			790	88	730	850	670	690 300	146541	361	88068
3:00	1530	1520	940	960			795	74	730	850	675	680 305	147195	354	88748
6:00	1540	1520	930	930			785	71	730	850	670	680,300	147537	342	89160
9:00															
12:00			935				800	90							

3978

Signature of Operators

Time Started

Date

JUL 21 1919

1839

Test #5

JUL 23 1918

Time	Installate taken off Laboratory Test						Uncondensable Gas	4" Coil Rael Gas Meter				Pressure	Draft	
	Water Reading	Gal Per Hr. Off	P	400 H.P Gal	Per		Meter Reading	#1	#2	#3	#4	Pounds Per Square In.	Stack Throttling	Front End Furnace
7														
8														
9														
10														
11														
12														
1														
2														
3														
4														
5														
6													

Sup 343

Twelfth Run.
Test of July 19th, 1919 Sheet # 8

Slop Bo. Gr. Gas Oil From Mid-Continent Crude.
IMPROVED [illegible] No. 2

Time	Refer to drawing 253 to explain letters. 4" Furnace Temperatures.				Stack Temp.	Stack Damper Reading	Oil Temperatures. Pump Discharge	Oil Temperatures. Heater Discharge	Reflux Temp.	Vapor Temperatures. Lower	Vapor Temperatures. Top	Raw Oil Consumed Meter Reading	Raw Oil Consumed Bbl.	Raw Oil Consumed No.	Manometer	Residuum drawn from 10" Oil Meter Reading	Residuum drawn from 10" Oil Bbl.	Residuum drawn from 10" Oil Sec.	Residuum drawn from 10" Oil B.F. No.
24h 12:00	N.End	N.End	S.End	S.End															
12:00	1555	1560	995	965	820	72	725	850	660	695	870	[illegible]			2½	[illegible]			
1:00	1555	1535	975	935	815	100	725	840	660	710	910	[illegible]			2½	87402	12	2	18.3
2:00	1520	1530	970	935	810	104	725	850	660	700	890	149815	389		2	89160	100	14	17.0
3:00	1570	1600	951	970	810	76	730	845	660	700	860	149946	375		2½	89255	95	13	17.2
4:00	1570	1590	960	970	805	70	720	840	660	695	870	149837	377		2½	89911	196	24	25.0
5:00	1560	1580	990	990	806	82	725	850	660	696	900	150232	395			90033	122	24	18.9
6:00	1550	1580	990	1000	806	79	720	840	660	700	870	150603	371			90312	279	24	23.4
9:00	[illegible]	[illegible]	992	995	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]			2	90336	92	2	[illegible]
12:00	1565	1565	965	1005	820	99	730	875	660	[illegible]	[illegible]	[illegible]			2½	90462	126	1.5	20.9

Totals 3034

Signature of Operators	Time Shift	Date	Fuel Pumping Plant	Ft.	In.	Time	Date	Contents	Tank No.	Ft.	In.	Time	Date
[illegible]	3PM to 11PM	7-24-19	Gauge on tank 7 before pumping	5	4½								
[illegible]		7-27-19	" " " 1 after pumping	2	2								
Glen Estes	11 to 7 a.m.	7-25-19	Pumped 1845 Bbls to Tank 22										
[illegible]			Pumped 2755										
[illegible]			By mistake Stock Tank was on tank 21										
[illegible]			Twice Pressure Distillate with tank 20 @ 6 PM										
[illegible]			Tank 20 gauged 2" @ 6 PM										
[illegible]			Tank 21 gauged 7-8½ @ 6 PM										

JUL 24 1919

1843

31.9 Br. Gr. Gas Oil From
N Id-Continent Crude.
APPROVED UNDER PLANT NO. 2

Refinery Gain.
Week of July 10th, 1919. JUL 24 1919 Sheet No. 6

Time	Distillate taken off Laboratory Test Meter Reading	Dist. drawn off	Sp. Gr.	400 F. Sp. Gr.	Sp. Gr.	Uncondensable Gas Meter Reading	6" Coil Fuel Gas Meter #1	#2	#3	#4	Pressure Manifold	Draft Ascension Breaching	Draft From Bed Furnace
24													
12:00													
2:00													
4:00													
6:00													
8:00													
10:00													
12:00		184506											
2:00													
4:00	65167	296464											
6:00	65346	208											
8:00													
10:00													
12:00													

2107 3376 85330 20604 17504 23640

Lab Naphtha 3376
Distillate 23,064

1845

Fuel Oil No. 6 or Gas Oil From Mid-Continent Crude.
Run over 100 Pressure No. 2

Page 364

Twelfth Run.
Test of July 19th, 1919 Sheet No. 7

Time	Refer to drawing 233 to explain letters. A" Furnace, Stack & Air Duct Temperatures.						Atmos	Oil Temperatures				Vapor Temperatures		New Oil Consumed			Recuperator	Residuum drawn from 10" Oil			
	A" Furnace Temperatures																				
	N.End	S.End	N.End	S.End	C.End	C.End	Stack Breeching	Atmosphere Temp.	10" Discharge	6" Discharge	Return	Pump	Lower	Top	Meter Reading	Gal.	Sp.		Meter Reading	Gal.	Sp.
25th																					
12:00																					
3:00	1560	1565	965	1035			825	100	730	660	670		695	340							
6:00	1550	1540	950	920			830	108	735	775	680		690	310	152100	3940					
9:00	1540	1540	900	930			820	88	730	860	670		670	260	152470	370					
12:00	1540	1540	900	950			820	82	720	870	680		680	290	152834	364					
26th																					
3:00	1560	1550	930	990			825	81	720	865	680		700	330	153213	379					
6:00	1555	1530	920	980			820	76	720	870	680		680	320	153578	365					
9:00	1570	1570	955	995			825	92	715	875	670		700	340							
12:00	1560	1545	945	1015			830	94	720	870			700								
Totals																3973					

Signature of Operators — Five Shift — Date.

L. C. Wolfe — 3 P.M. to 11 P.M. — 7-25-19
C. Freiwe — "
Glen Carter — 11 P.M. to 7 A.M. — 7-26-19
Jon Backus — " " " "
[illegible] — 7 A.M. to 3 P.M.
A. Eckstein

JUL 26 1919

Fuel Pumping Plant — Ft. — In. — Time — Date.

Contents	Tank No.	Ft.	In.	Time	Date.
	1				
	2				
	3				
Gas	20	1	1½	12-PM	26
	21	7	9		
	22	4	9½		
	23	5	3½		
	1				
	2				
	3				
	20	2	4		
	21				
	22				
	23				

JUL 26 1919

1847

31.9 Bt. Gr. Gas 11 From
Mid-Continent Crude.
IMPROVED DUBBS PLANT NO. 2

Page 44 B.

Twelfth Run.
Test of July 19th, 1920. Sheet # 7

Time	Distillate taken off Laboratory. Meter Reading	Gal. drawn off	No. 400 Gal.	B.P.	Uncondensable Gas Meter No.	Uncondensable Gas Meter Reading	4" Coil Test Gas Meter # 1	# 2	# 3	# 4	Pressure Pounds per Square Inch	Draft. Check Draft Over Bag	Draft. Check Draft Bag Furnace
July 25													
12:00											120	.3	.14
3:00											120	.3	.16
6:00											120	.25	.17
9:00											120	.2	.17
12:00	42267	3	42963	48	565	120 879					120	.21	.17
July 26													
3:00	42294	237	43696	534	563	130604					120	.21	.18
6:00	42621	347	44060	7	618	131240					120	.22	.20
9:00											120	.23	.18
12:00											120	.21	.18

National Gas 92,477 Cu Ft.
Fuel Gas 2,693 Cu Ft.

1948

Twelfth Run
Test of July 19th, 1919.

Sheet 8

51.9 % Gr. 0 gs Oil From Mid-Continent Crude.
CRACKING TUBES-PLANT NO. 2

11 1365

Time	Refer to drawing 235 to explain letters. 4" Furnace, Stack & Air Duct Temperatures. 4" Furnace Temperatures. A.End	M.End	S.End	O.End	S.End	S.End	Breaching D	Atmospheric Temp.	10" Discharge	4" Discharge	Reflux B	E	Z	Power K	Vapor Temperature Lower	Top	Raw Oil Consumed Meter Reading	Gal.	Re.	Manometer	"M" Residuum drawn from 10" Coil Meter Reading	Gal.	400 I.P. Z	Re.
July 26																								
12:00	1560	1560	940	990			830																	
2:00	1565	1565	925	995			840	120	715	860	670				700	230	154710	3.3	1	2	91776	139	2½	24.3
4:00	1550	1550	920	970			840	110	725	770	680				710	260	155130	1.90		2¼	91906	130	2	24.2
6:00	1540	1550	930	970			830	58	730	760	670				710	250	155565	3.73		2	91700	120	1½	20.3
8:00	1560	1540	930	990			830	81	725	870	670				680	270	155934	3.69		2¼	91813	83	2	17.7
29																								
2:00	1540	1560	920	980			820	78	720	840	660				690	160	156316	3.92		2¼	91939	56	1½	15.7
4:00	1570	1590	950	1000			820	76	710	840	660				700	130	156718	3.92		2¼	92182	243	1½	26.8
6:00	1560	1580	930	1010			820	96	715	850	670				710	140	157080	3.62		2	92320	138	2	23.9
8:00	1565	1560	945	1005			835	99	725	840	670				710	130	157480	3.93		2	92440	120	1½	23.1
Totals																								

Signatures of Operators	Time Shift	Date	Pool Pumping Plant	Ft.	In.	Time	Date	Contents	Tank No.	Ft.	In.	Time	Date
L. C. McNally	3 PM to 11 PM	7-25-19	Charge on Tank [illegible] before pumping			7 PM	7-26						
C. Freimuth	" " "	7-26-19	" " " 3 " "			2 PM	7-27						
Glen Estes	11 PM to 7 AM	7-29-19	Charge on Tank [illegible] before pumping			[illegible]	[illegible]						
For Richie	" " "	"	[illegible]										

JUL 31 1919

16 Fires

O.K. McKinney

1951

Test of Pulv. Fuel, 1919.

Time	Distillate taken off laboratory				Uncondensable Gas	Coal Fuel		Gas Meter		Pressure		
July 24	Meter Reading	Date drawn off	No.	400 cu. ft. Gal.	Meter Reading	#1	#2	#3	#4	Pounds per square inch	Stack Draught in.	Aft. front Pad Furnace
12:00												
1:00												
2:00												
3:00												
4:00												
5:00												
6:00												
7:00												
8:00												
9:00												
10:00												
11:00												
12:00												
1:00												
2:00												
3:00												
4:00												
5:00												
6:00												
7:00												
8:00												
9:00												
10:00												
11:00												
12:00												

Natural Gas 94.04 Cu Ft
Mine Gas 5.96 Cu Ft

1853

JUL 2 1919

Test of July 18th, 1919. Sheet # 9

No. 2 Dr. Gr. Gas Oil from Mid-Continent Crude. IMPROVED DUBBS PLANT No. 2

Time	Refer to drawing 238 to explain letters. 4" Furnace Temperatures.				Stack & Air Duct Temperatures		Tubes Preheating D	Coil Temperatures. 10" Coil Discharge	4" Coil Discharge	Reflux		Vapor Temperatures.		Raw Oil Consumed Meter Reading	Gal.	Bbls.	Barometer	Residuum drawn from 10" Coil Meter Reading	Gal.	400 Test.	Bbls.
July 27	1.End	2.End	3.End	4.End	1.End	2.End				G	B	Upper	Lower								
12:00																					
3:00																					
6:00	1500	1500	940	940			715	105	720	755	670		700	220				0			
9:00	1515	1510	920	940			700	98	710	745	660		700	170							
12:00	1515	1500	910	960			700	82	710	750	660		690	190							
25th																					
3:00	1515	1500	910	960			700	78	710	750	660		700	200							
6:00	1520	1500	915	980			700	76	710	745	660		700	200							
9:00																					
12:00																					

Totals

Signature of Operators Time Shift Date. Heel Pumping Plant Ft. In. Time Date.

Contents Tank No. Ft. In. Time Date.

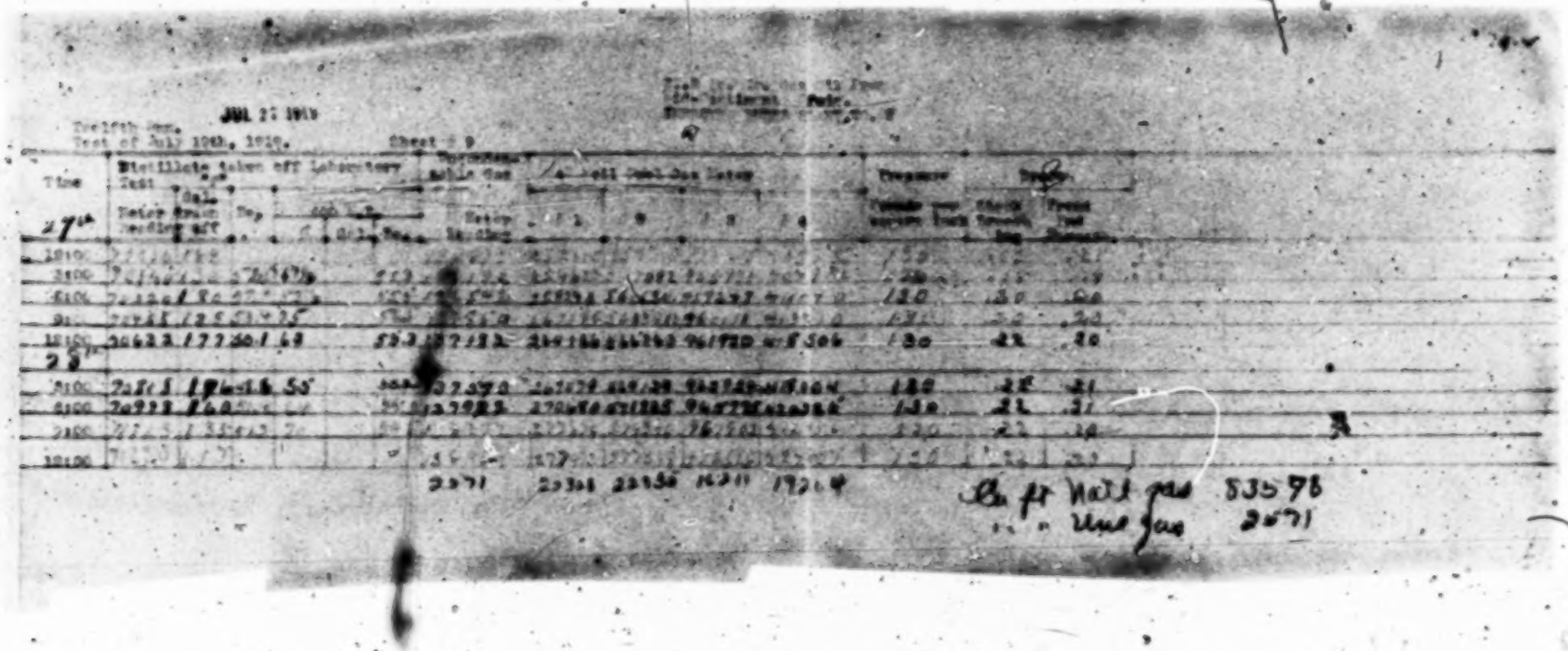
at 12 noon July 27-19 the fuel was reduced to 700 degrees and the temperature and amount of fuel oil to the coils was not changed. The fuel oil was turned off at 12 midnight July 27-19 and the fires were put out. The fuel oil was turned off at 12 midnight July 27-19 and the fires were put out.

Glen Estes 11-3 PM to 7-9 AM 7-28-19

Lon Lackey " " " " "

JUL 2 1919

856



JUL 23 1919

Twelfth Run.
Test of July 10th, 1919. Sheet # 9

Time	Distillate taken off Laboratory Test				Temperature Water Gas	Still Vapor Gas Below				Pressure		Degree
17th	Date	Meter Reading	Dry Gas	Gals. per hr.	Temp. in Deg.	1	2	3	4	Vapor Gas from Still	Check Pressure Gas	Vapor Gas
1910												
2000												
2100										120	30	60
2200												
2300										130	22	20
18th												
0100										130	22	21
0200										130	21	21
0300											22	19
0400												
					2071	23301	23150	1931	1921			

Gals per Hour Gas 83578
" " Line Gas 2071

1857

10-1

Test of July 19th, 1919. Sheet # 10

Refer to drawing D-3 to explain letters.

Time	4' Furnace Temperatures. A. End	B. End	C. End	D. End	Stack & Air Duct Temperatures. Stack Breeching	Thermometer Temp.	Oil Temperatures. 10" Discharge	2" Discharge	Reflux G	Reflux H	Pump J	Vapor Temperatures. K Lower	K Top	Raw Oil Consumed Meter Reading	Gal.	Dr.	Manometer	Residuum drawn from 10" Coil Meter Gal. Reading	400 B.P. #	Dr.
12:00																				
3:00					930	22	730	630	1240			710	16	139247.270				236[illegible].9	1½	24.5
6:00	1510	1540	1510	1540	810	104	720	540				710	150	161245.303				238612.1	1.9	26.3
9:00																				
12:00																				
3:00																				
6:00																				
9:00																				
12:00																				
Total																				

Signature of Operator [illegible] Time Shift [illegible] Date. 7-27-19

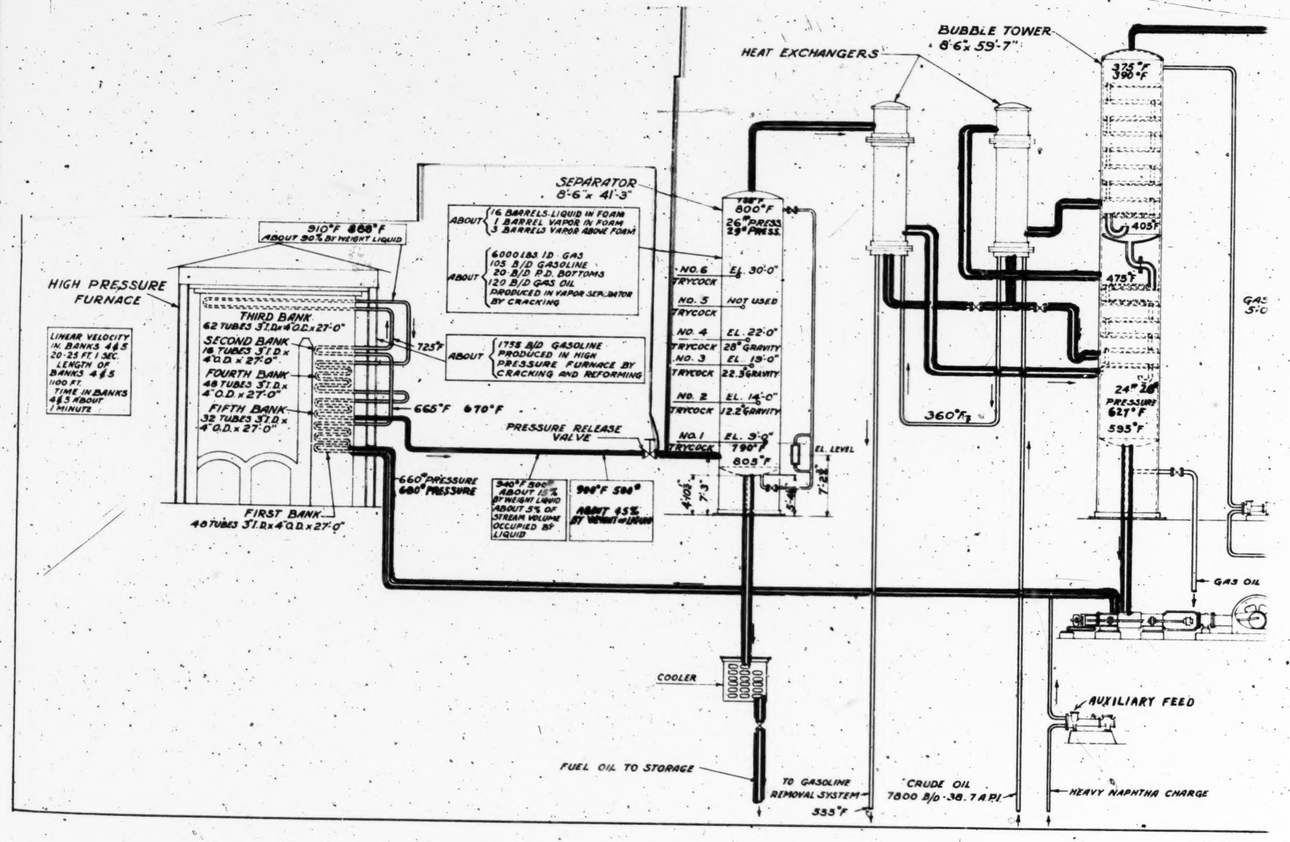
Fuel Pumping Plant Ft. In. Time Date.

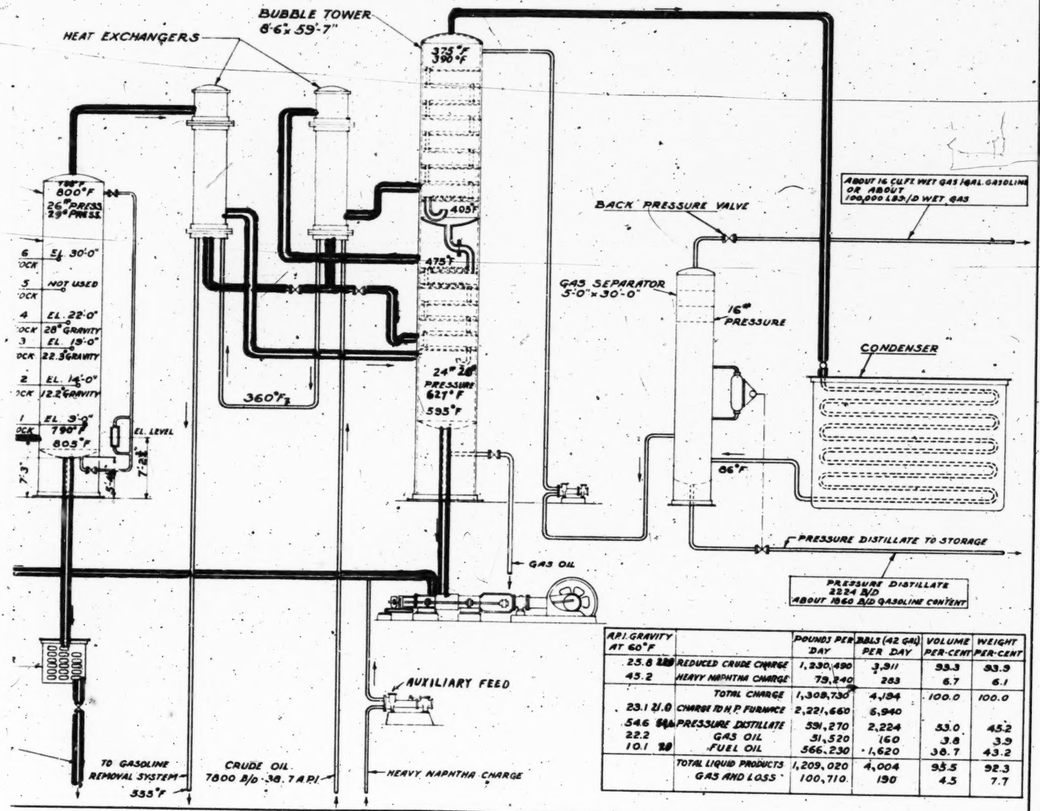
Turned at 6.00 Pm

Contents Tank No. Ft. In. Time Date.

JUL 28 1919

1859





API GRAVITY AT 60° F		POUNDS PER DAY	BBLS (42 GAL) PER DAY	VOLUME PER-CENT	WEIGHT PER-CENT
23.8 [illegible]	REDUCED CRUDE CHARGE	1,230,490	3,911	93.3	93.9
45.2	HEAVY NAPHTHA CHARGE	78,240	283	6.7	6.1
	TOTAL CHARGE	1,308,730	4,194	100.0	100.0
23.1 [illegible]	CHARGE TO H.P. FURNACE	2,221,660	6,940		
54.6 [illegible]	PRESSURE DISTILLATE	591,270	2,224	53.0	45.2
22.2	GAS OIL	31,520	160	3.8	3.9
10.1 [illegible]	FUEL OIL	566,230	1,620	38.7	43.2
	TOTAL LIQUID PRODUCTS	1,209,020	4,004	95.5	92.3
	GAS AND LOSS	100,710	190	4.5	7.7

	Gallons	Price	Amount	Cost per Gal
Stocks Consumed				
Pennsylvania Gas Oil	411C318	0400	4411277	
Mixed White	219667	0400	878668	
Ozarka White	152007	0400	608028	
Total Stocks Consumed	781992	0400	3127968	0561
Plant Operating				
Supervision			411036 5	
Firemen			159884	
Pumpmen			141176	
Stillmen			41247	
Miscellaneous			33397	
Total Plant Operating			869069	0139
Repairs				
Converters			27600	
Dephlegmators			23263	
Piping & Tools			173624	
Lines and Tanks			283431	
Buildings			96051	
Total Expense			602469	0096
Coal Operating accounts				
Salaries and Expenses			111185	
RENT OF BUILDING			22000	
WORKS OFFICE EXPENSE			1200	
Telephone and Telegraph			10661	
Laboratory Expense			9857	
Coal Plant Expense			172056	
Light and Power			97623	
Purchased Gasoline			53760	
Total Coal Operating Accts			204980	0327
Grand Total Cost	62477 3 Gals		6641991	1067
				0107
				0962

Bbl. Yield	Production	Gal	Price	Amount
7.54	Gasoline	58943	.1600	943088
11.16	Blending Stock	87259	.1200	1047108
15.19	Fuel Oil	118753	0200	237506
33.96	Light Kerosene	265539	0400	1062156
12.05	Heavy Residue	94279	0200	188558
79.90	Total	624773	0557	3478416
20.10	Loss	157219		
100.00	Total	781992		

68

Summary -

Cost	624773 Gals	6641991	1069 per Gal
Value	624773	3478416	0557
Earnings		2763575	4512

DEPARTMENT OF COMMERCE

United States Patent Office

To all persons to whom these presents shall come, Greeting:

This Is To Certify that the annexed is a true copy from the records of this office of the Disclaimer, filed December 2, 1931; and the decision of the Examiner of Interferences, dated December 5, 1931, in the matter of

Interference Number 49,355,

Dubbs *vs.* Behimer,

Subject Matter:

Process of Making Gasoline.

In Testimony Whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed, at the City of Washington, this fifth day of March, in the year of our Lord one thousand nine hundred and forty and of the Independence of the United States of America the one hundred and sixty-fourth.

Conway P. Coe,
Commissioner of Patents.

(Seal)

Attest:

D. E. Wilson,
Chief of Division.

2737 (Stamp) Docket Division Dec 2 1931 U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

Dubbs
vs.
Behimer } Interference No. 49,355.

DISCLAIMER.

Otto Behimer, whose application Serial No. 630,242, filed April 6, 1923, is involved in the above entitled interference, hereby disclaims all of the counts of the issue as quoted below, and withdraws from the interference.

"1. A process of converting relatively heavy into lighter hydrocarbons, consisting in passing a stream of oil through a zone where the oil is heated to a cracking temperature but without substantial vaporization, passed thence to and through a zone where vaporization takes place, removing the vapors, subjecting them to reflux condensation, returning reflux condensate for further cracking, removing the residue, after said vaporization, from the system without permitting intermingling of any substantial portion thereof with the oil in the heating zone and maintaining a pressure upon the material during distillation.

"2. A process of converting heavy into lighter hydrocarbons consisting in passing in an advancing direction a stream of oil through a zone where the oil is heated to the cracking temperature but substantial vaporization prevented and thence to and through a zone where vaporization takes place, removing the vapors and condensing them, returning a portion of the condensates to the heating zone for further treatment, removing the residue after said vaporization from the system without permitting contact or intermingling of any substantial portion thereof with the oil in the heating zone and maintaining a vapor pressure upon the material under treatment during distillation and condensation.

"3. A process of converting heavy into lighter hydrocarbons consisting in passing in an advancing direction a stream of oil through a heating zone where the oil is heated to a cracking temperature but substantial vaporization prevented and thence to an enlarged chamber where va-

porization takes place, removing the vapors from said chamber and condensing them and returning a portion of the condensates to the heating zone for further treatment, withdrawing substantially continuously the residue from said chamber and discharging the same entirely apart from the feed of oil to the heating zone and maintaining a vapor pressure upon the material under treatment during distillation and condensation.

1

2738 "4. A process of converting heavy into lighter hydrocarbons consisting in passing in an advancing direction a continuous stream of oil through a heating zone where the oil is heated to a cracking temperature but substantial vaporization prevented and thence to a chamber where vaporization takes place, discharging from the chamber substantially continuously a quantity of the residue proportional to the amount of oil supplied to the heating zone and said vaporization, condensing the vapors and returning a portion of the condensates to the stream of oil for re-treatment in the heating zone and maintaining a vapor pressure upon the material under treatment during distillation and condensation.

"5. A continuous process for cracking hydrocarbons consisting in passing the same in a stream in an advancing direction from an inlet point to a discharge point separated and entirely disassociated from the inlet point, subjecting the material in the first stage of its travel to a cracking temperature while preventing substantial vaporization, affording a vaporization space above the stream during the second stage of the travel thereof to said discharge point, taking off the vapors from said vapor space and subjecting them to a condensing action, discharging into the stream at a point remote from that where vaporization occurs a portion of the condensates and maintaining a vapor pressure on the material under treatment during distillation and condensation.

"6. A process of cracking oil consisting in continuously passing a stream of oil through a series of tubes seated in a cracking zone where the oil is heated to the cracking temperature but substantial vaporization prevented, and thence to an enlarged vapor chamber where vaporization takes place, removing the vapors from said chamber, subjecting them to an initial condenser where a portion of the vapors are condensed, subjecting the uncondensed portion

of the vapors to a final condensation, returning the condensate from said initial condensation to the inlet side of the cracking tubes and continuously drawing off the residue from the vapor chamber and preventing it from returning to the cracking zone and maintaining a pressure on the oil during treatment.

"7. A process of cracking oil consisting in progressively passing the oil through a heating zone where the oil is heated to the cracking temperature but substantial vaporization prevented and then passing the heated oil through a vaporizing zone, forcing the carbon containing residue out of the system and preventing it from coming in contact with the incoming charging stock taking off vapors from the vapor zone and condensing them and returning condensate therefrom to and mixing it with the fresh charging stock which is being passed through said zone.

2

2739 "8. The process for treating hydrocarbon oil by heating it to a cracking temperature and condensing the condensable products volatilized therefrom under pressure, consisting in raising the oil to a cracking temperature without substantial vaporization in a heating zone, passing the heated oil to a second zone where vaporization occurs, removing the vapors and subjecting them to condensation, subjecting a portion of the condensate to further cracking, taking off the carbon containing residuum from the second zone without permitting access of any substantial portion thereof to the heating zone and maintaining a pressure upon the materials under treatment, substantially as described."

Signed at Chicago, Illinois, this 26th day of Oct., 1931.

Otto Behimer.

Witness:
Lee J. Gary.

The Texas Company, assignee of the entire right, title and interest in and to the above indicated application of Otto Behimer, Serial No. 630,242, filed April 6, 1923, involved in the above entitled interference, hereby assents to the foregoing disclaimer.

The Texas Company,
By R. C. Holmes,
President.

(Seal)
Attest:
W. G. Elicker,
Assistant Secretary.

3

2740 224

AGP

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

Paper No. 132

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

DEPARTMENT OF COMMERCE

United States Patent Office

Washington

Please find below a communication from the Examiner of Interferences in this case.

Thomas E. Robertson,
Commissioner of Patents.

(Stamp) Mailed Dec 5-1931.

Interference No. 49355.
Dubbs *vs.* Behimer.

Proceedings are resumed and the following action taken.

A disclaimer of the invention covered by the subject matter in issue having been filed by Behimer, the senior party, and the same having been concurred in by the assignee, and otherwise found to comply with the requirements of Rule 125, priority of invention of the subject matter in issue is hereby awarded to Carbon P. Dubbs, the junior party.

The said instrument is construed as a waiver of the right of appeal, and no time for appeal is therefore set.

H. H. Jacobs,
Examiner of Interferences,
Room 255.

4

1873

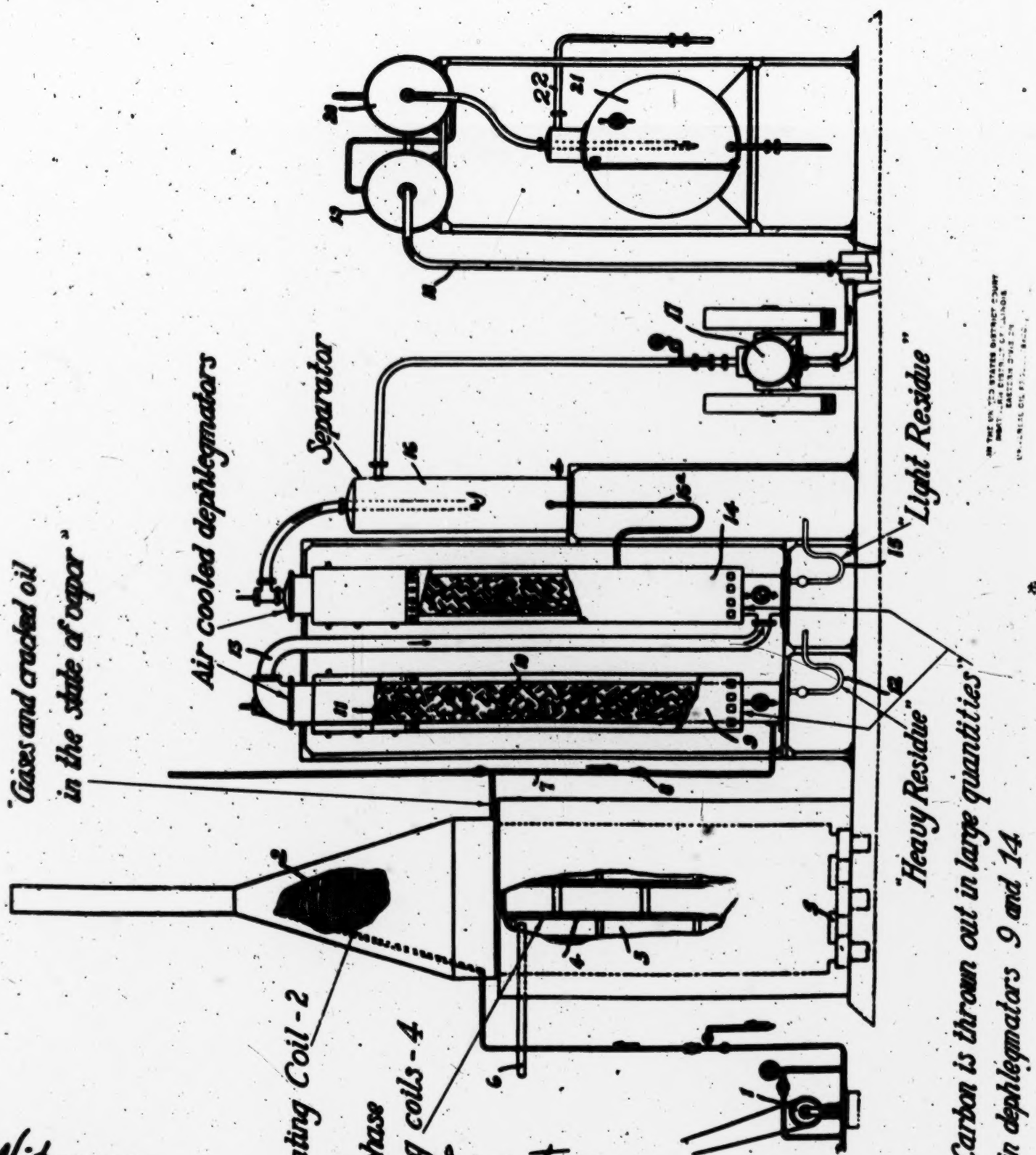
W. A. HALL.

PROCESS OF MAKING MOTOR FUEL

APPLICATION FILED JAN. 23, 1915.

1,175,910.

Patented Mar. 14, 1916.



Witnesses.

A. J. Hayworth

Inventor.

William A. Hall - by

A. B. Foote.

(No Model.) 5 Sheets—Sheet

C. M. PIELSTICKER.

DISTILLATION OF HYDROCARBON OR OTHER OILS.

No. 477,153. Patented June 14, 1892

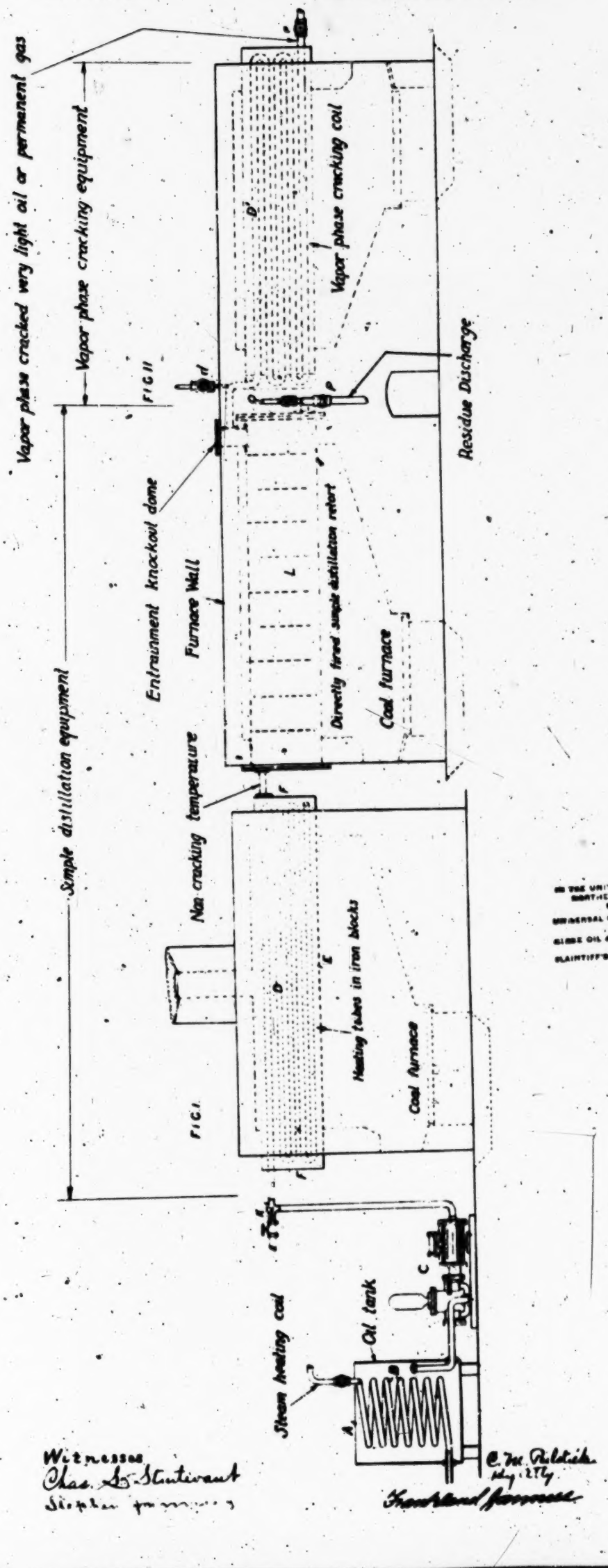


FIG II

FIG I.

As interpreted by Dr. Brown

Witnesses
Chas. L. Stutevant
Stephen Thompson

C. M. Pielsticker
by his Atty

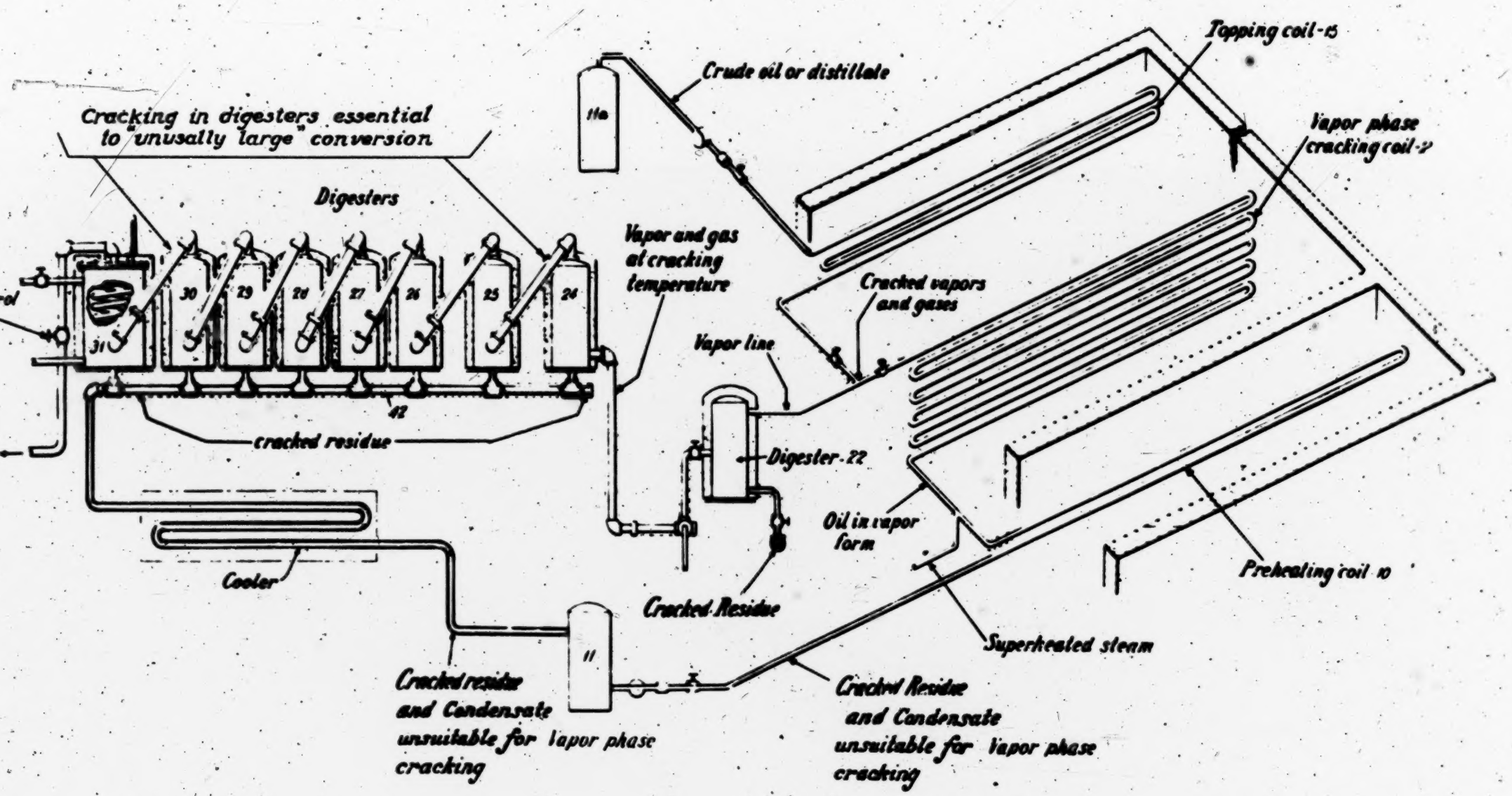
IN THE UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION
UNIVERSAL OIL PRODUCTS CO.
vs. No. 18744
GLOBE OIL & REFINING CO.
PLAINTIFF'S EXHIBIT 237

1,181,975

IN THE UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION
UNIVERSAL OIL PR... CO. / No. 15744
STAND. OIL & REFIN... CO.
PLAINTIFF'S EXHIBIT 938

As interpreted by Dr. Brown

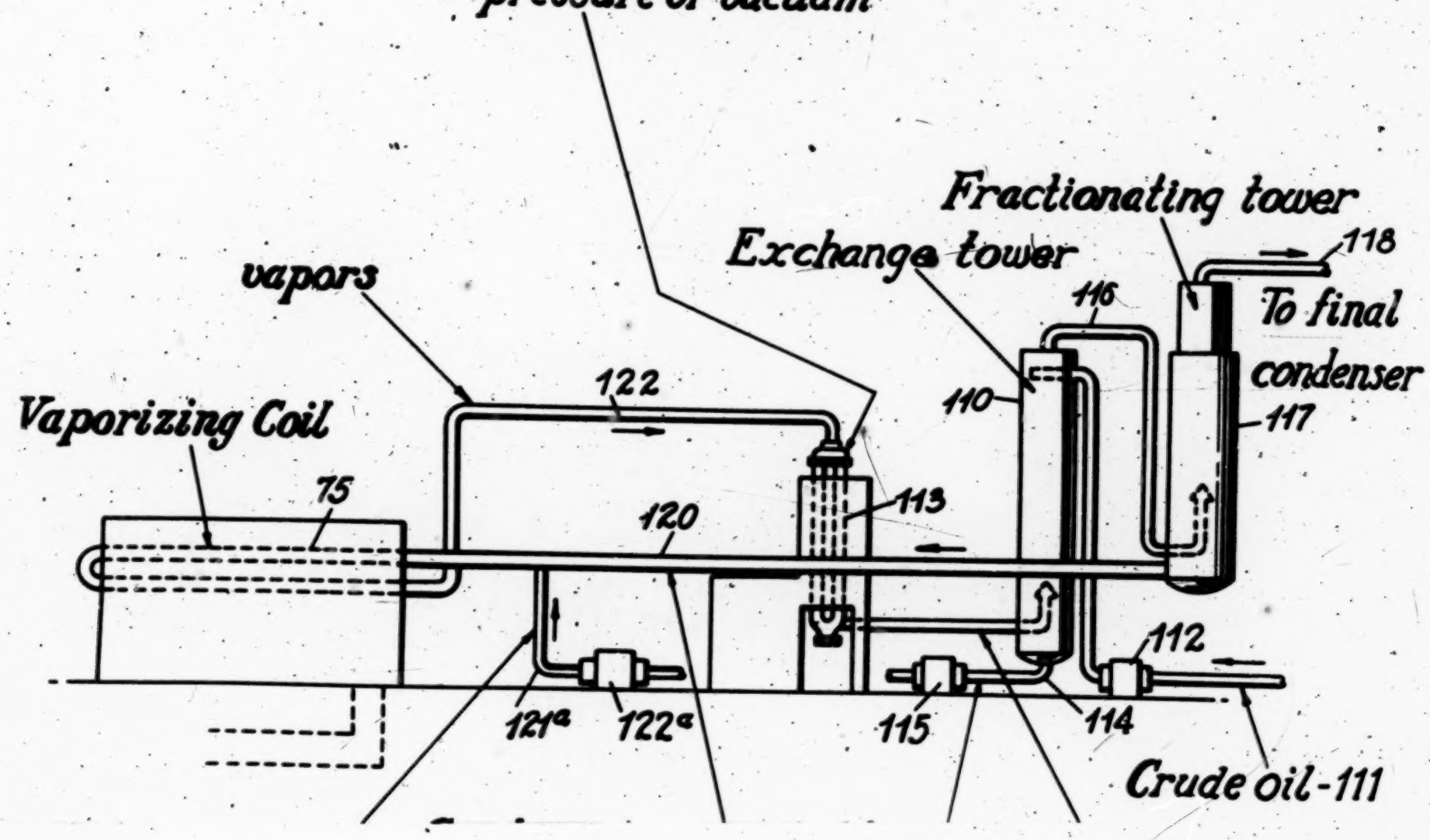
Greenstreet - Patent No. 1,740,691.

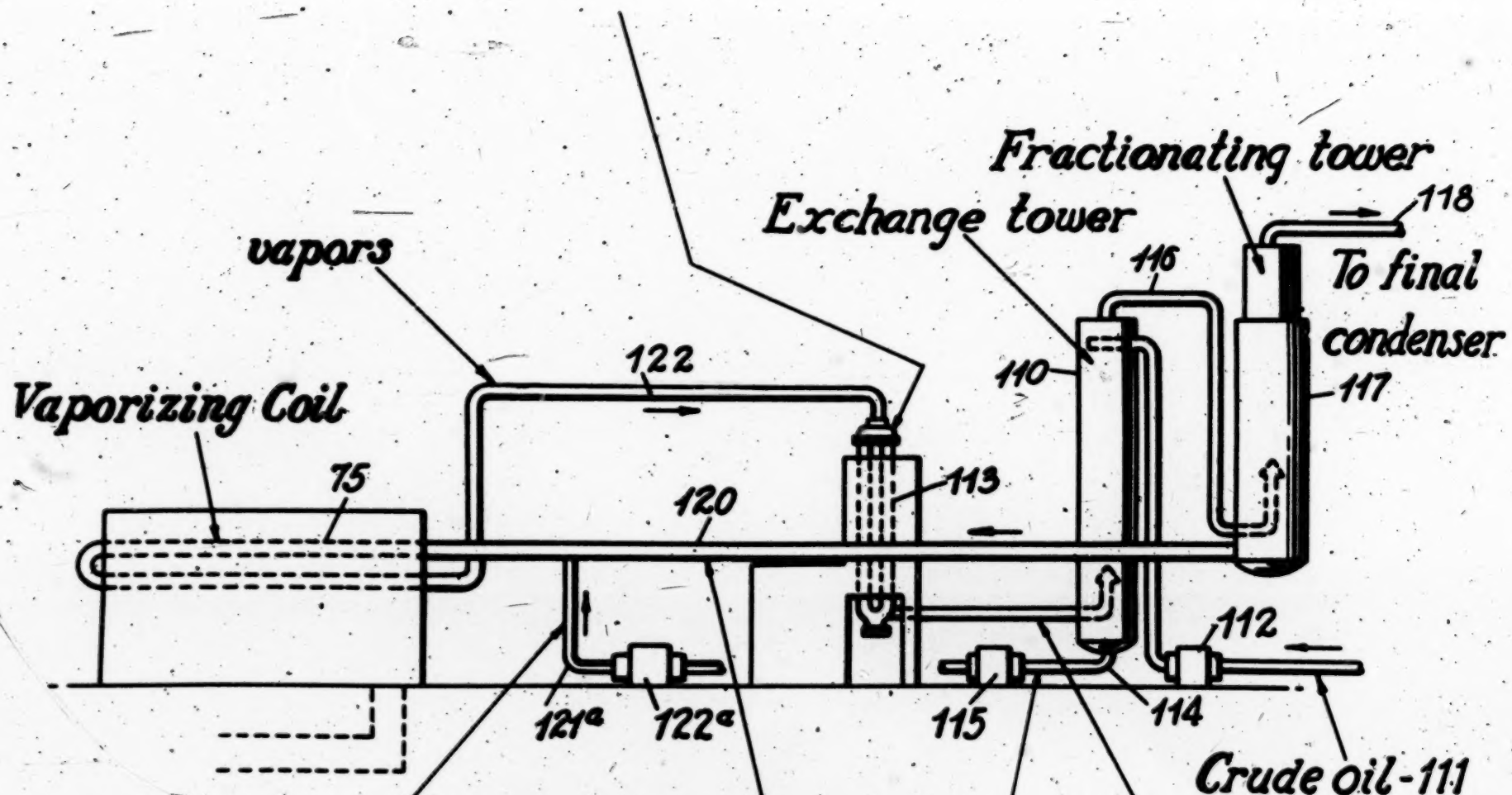


Alexander - Patent No. 1,407,619.

Fig. 8 wherein Vaporizer. 75 of Fig. 5 is incorporated. page 6 line 95 to 100

As interpreted by Dr. Brown





1879

IN THE UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION
LEGAL OIL PRODUCTS CO.
vs.
SUN OIL & REFINING CO.
PLAINTIFF'S EXHIBIT 839

1881

IN THE UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION
UNIVERSAL OIL PRODUCTS CO
vs.
LONE OIL & REFINING CO
PLAINTIFF'S EXHIBIT

Fig 1

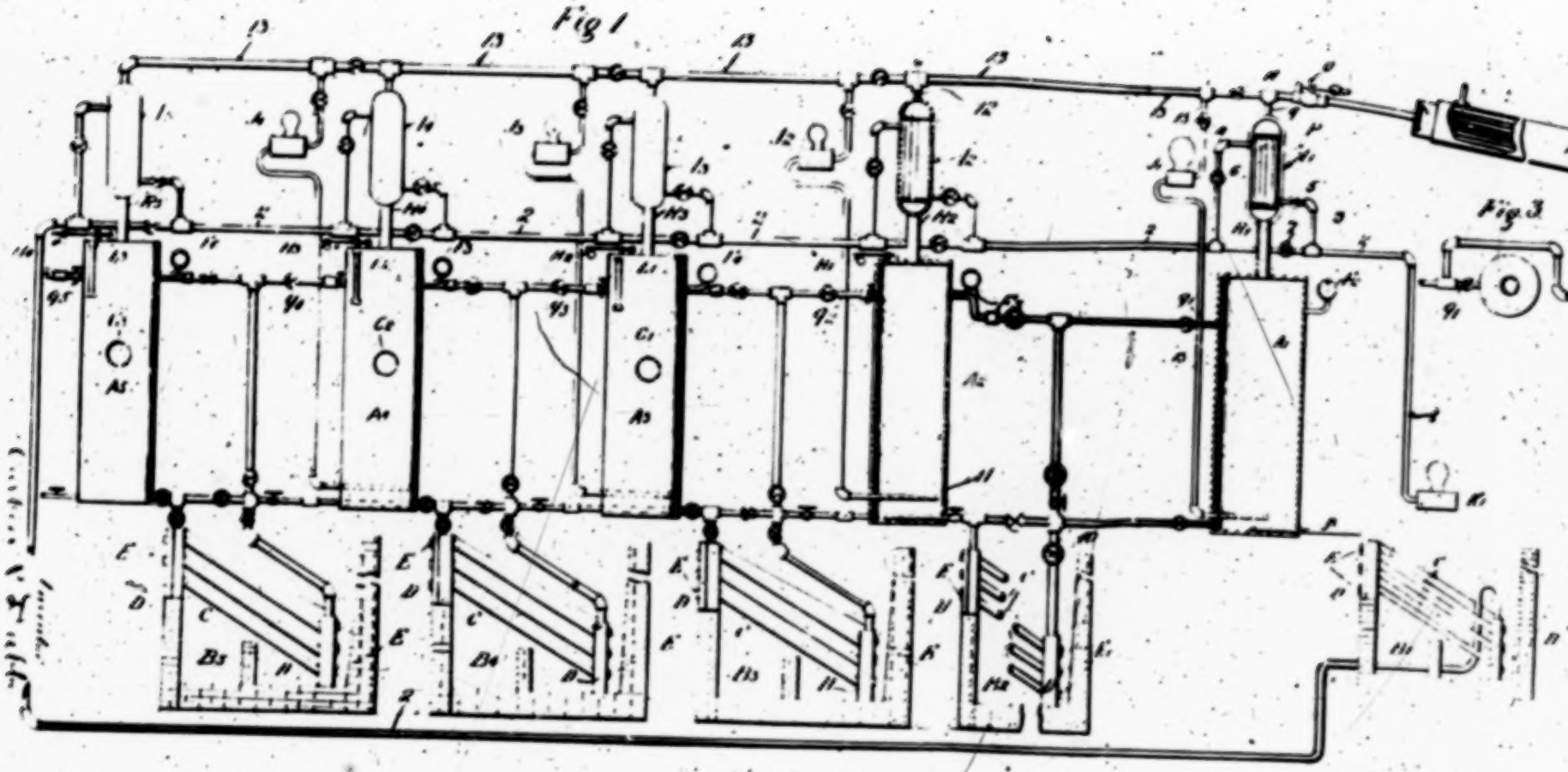


Fig 2

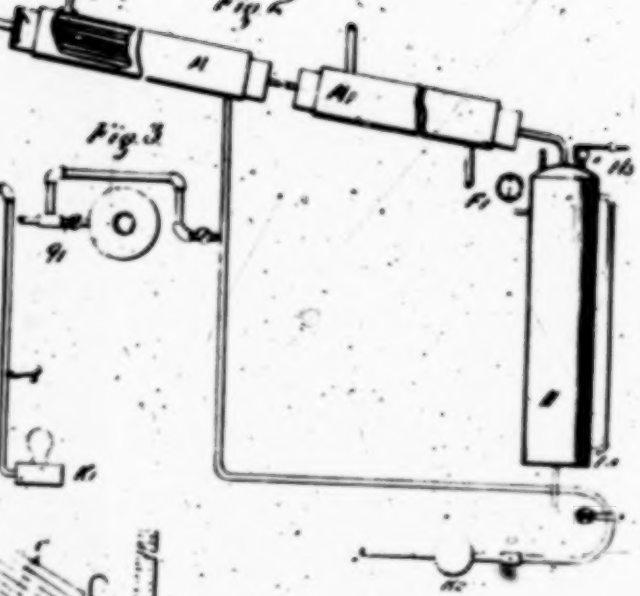
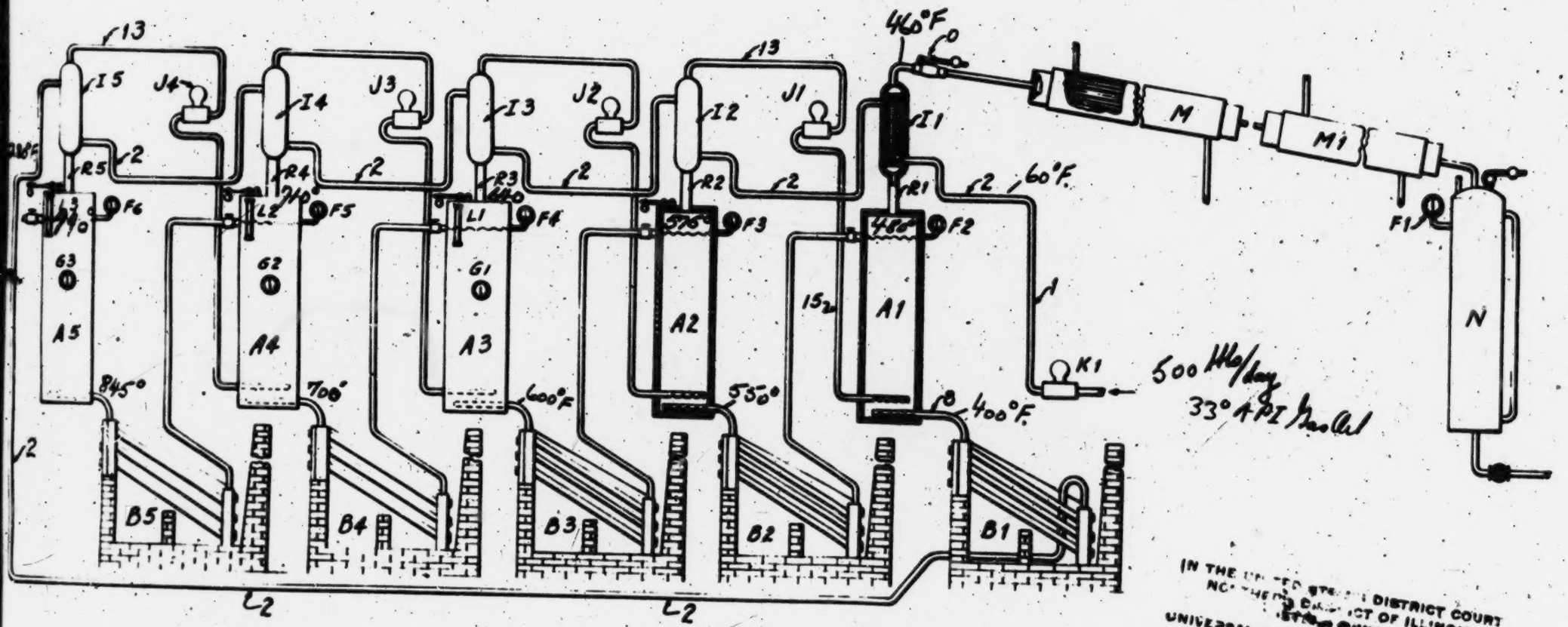


Fig 3



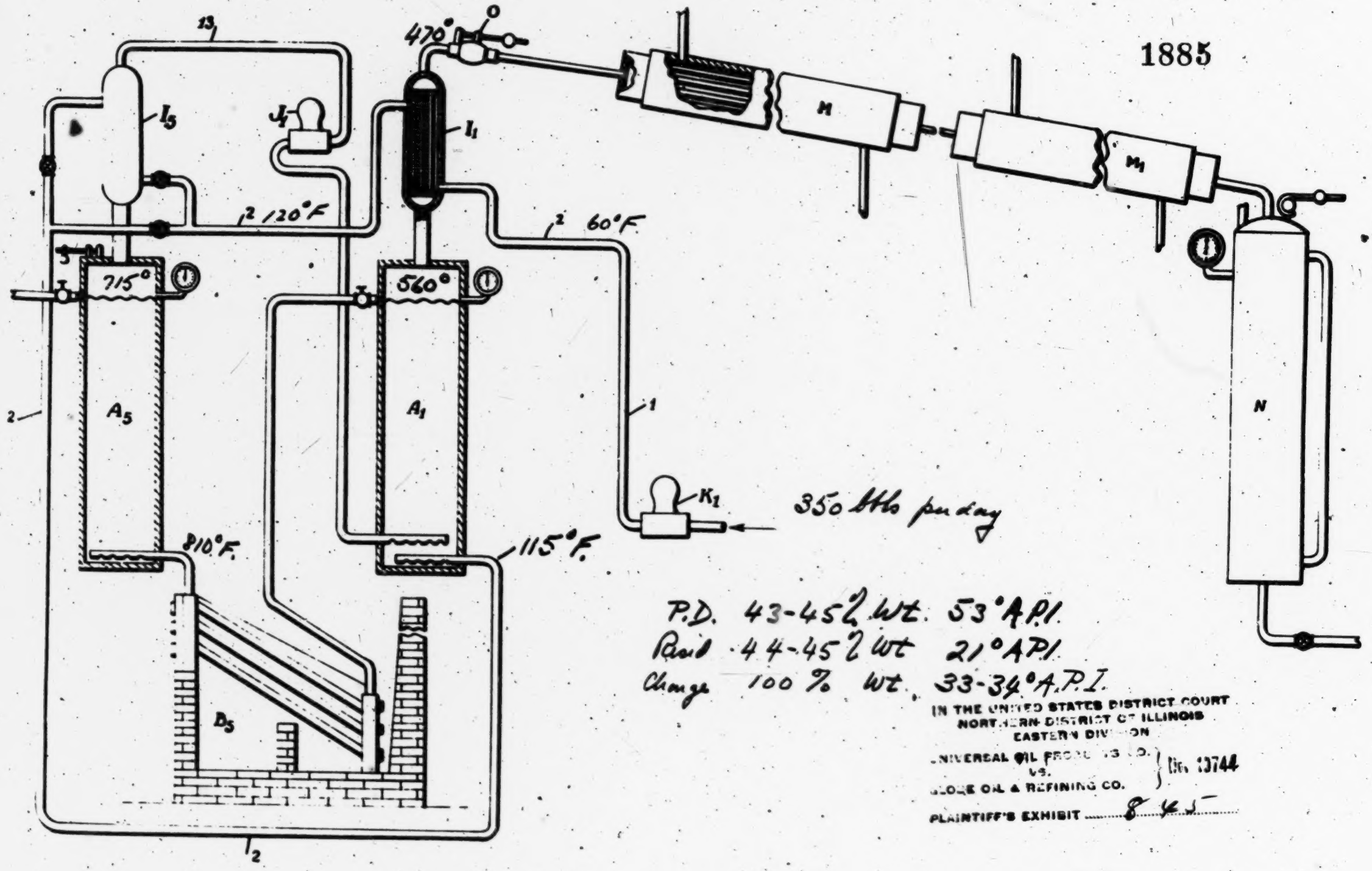
IN THE UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION
UNIVERSAL OIL PRODUCTS CO.
GLOBE OIL & REFINING CO. } No. 18744
PLAINTIFF'S EXHIBIT 8 KX

Dubbs Application
144,979 Filed Jan. 27, 1917

Using all 5 stills and omitting means for bypassing not used in this assembly

P.D. 45% wt 53-54° API
Run 42% wt. 19° API
Charge 100% wt. 33° API
35-40% wt. gasoline

1885

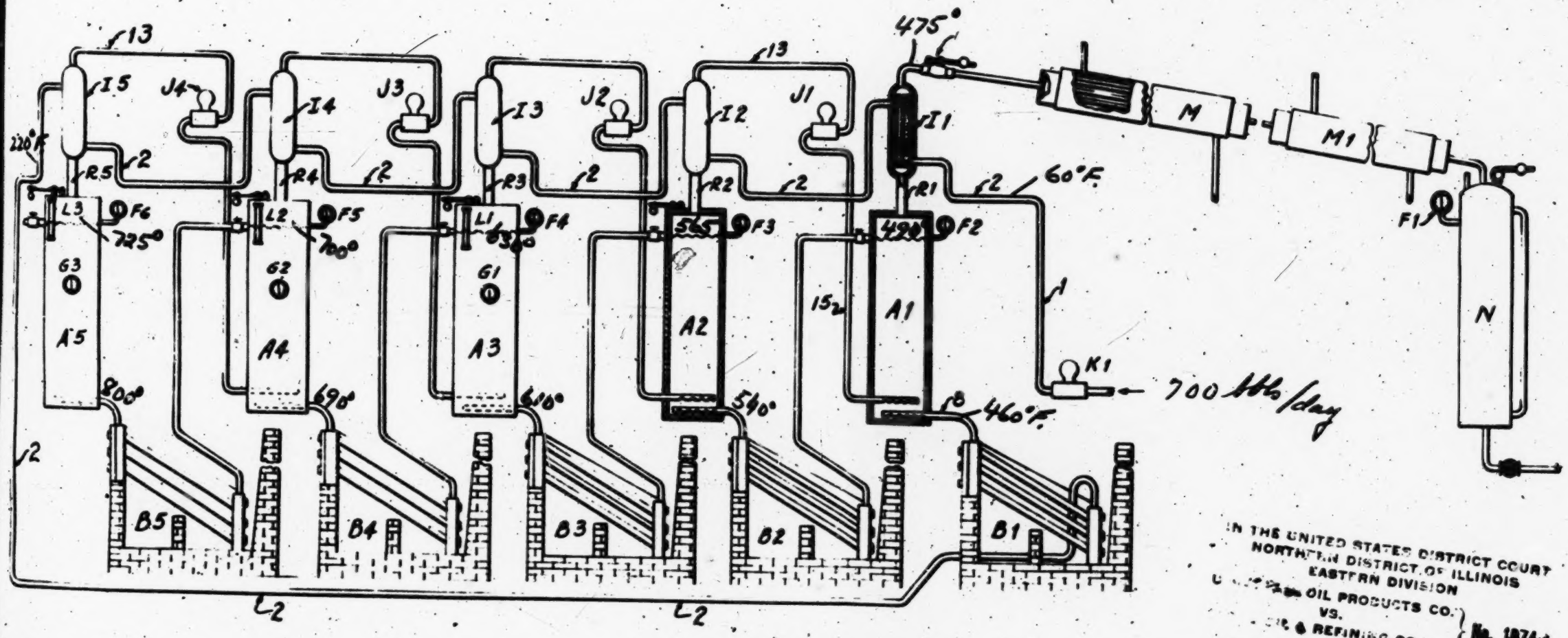


P.D. 43-45° Wt. 53° A.P.I.
Raid 44-45° Wt 21° A.P.I.
Change 100 % Wt. 33-34° A.P.I.

IN THE UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION

UNIVERSAL OIL PRODUCTS CO.
vs.
GLOBE OIL & REFINING CO.
} Dkt. 13744

PLAINTIFF'S EXHIBIT 845

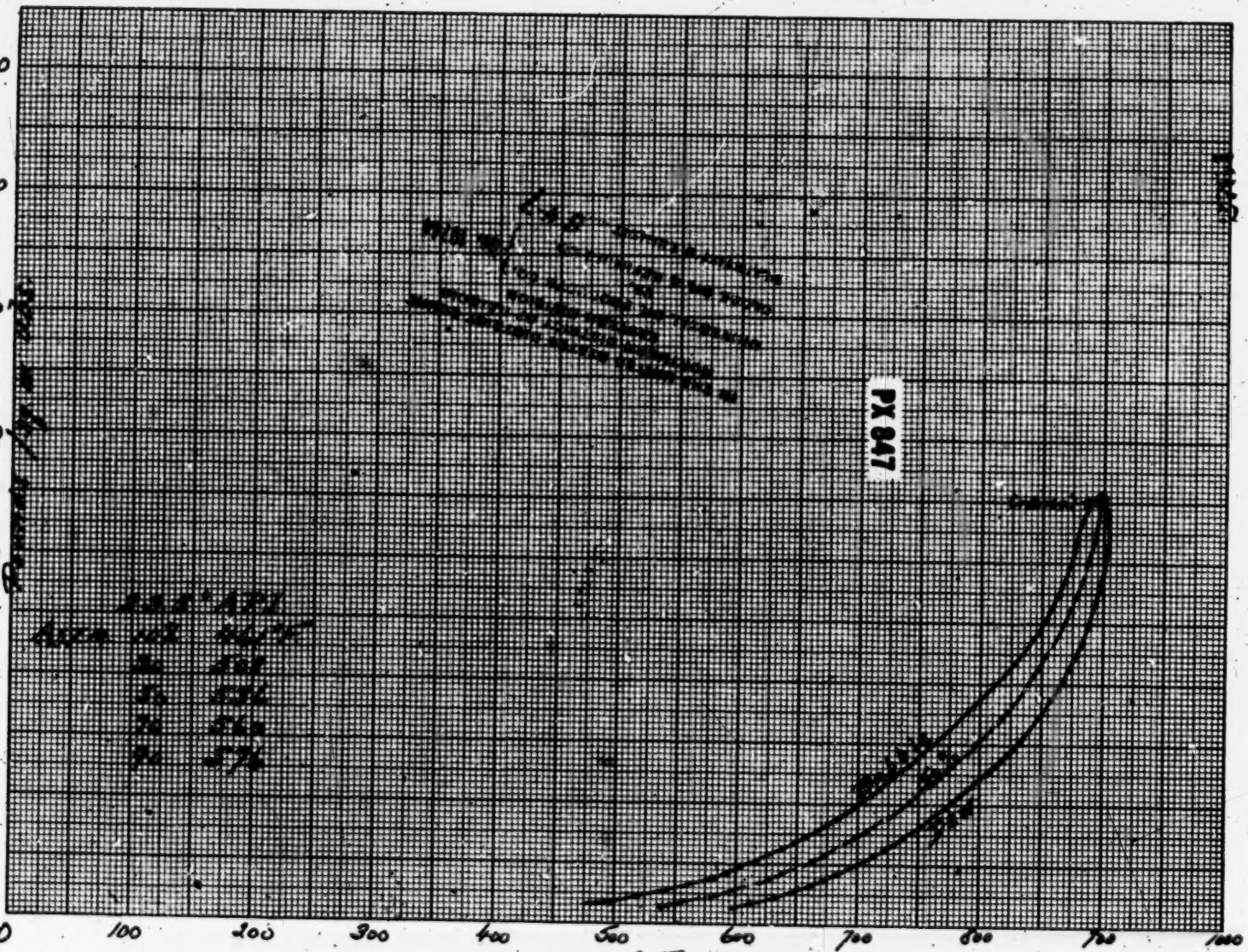


IN THE UNITED STATES DISTRICT COURT
NORTHERN DISTRICT OF ILLINOIS
EASTERN DIVISION
[illegible] OIL PRODUCTS CO.
VS.
[illegible] & REFINING CO. } No. 18743
EXHIBIT 846

Charge	37° API	100% Wt.
Dist.	17°	39%
S.R. Naphtha	57°	28-29%
Cracked P.D.	53-54°	27%
Heartless		47-48%

Dubbs' Application
144,979 Filed Jan. 27, 1917

Using all 5 stills and omitting means for bypassing not used in this assembly


700
600
500
400
300
200
100
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700
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900
1000
PX 847

1889

2765 PX 848.

390

DEPARTMENT OF COMMERCE

United States Patent Office

To all persons to whom these presents shall come, Greeting:

This Is To Certify that the annexed is a true copy from the records of this office of the File Wrapper, Contents and Drawings, in the matter of the

Abandoned Application of
Carbon P. Dubbs,

Filed January 27, 1917, Serial Number 144,979,
Renewed December 14, 1921, Serial Number 522,397,

for

Improvement in Method and Apparatus for Treating Petroleum and Other Hydrocarbons.

In Testimony Whereof I have hereunto set my hand and caused the seal of the Patent Office to be affixed, at the City of Washington, this nineteenth day of October, in the year of our Lord one thousand nine hundred and thirty-six and of the Independence of the United States of America the one hundred and sixty-first.

Conway P. Coe,
Commissioner of Patents.

(Seal)

Attest:

D. E. Wilson,
Chief of Division.

2766 1917 Abandoned
Special

Number (Series of 1915), 522397
Div. 39

Book 6
(Ex'r's Book) .....
Patent No. .....

Name Carbon P. Dubbs,
Assor. to Universal Oil Products Company of Chicago, Ill., a corp. of South Dakota,
of Wilmette
County of .....
State of Illinois

Invention Method and Apparatus for Treating Petroleum and Other Hydro-Carbons.

Parts of Application Filed	Original		Renewed
	Petition	Jan. 27, 1917	Dec. 14, 1920
	Affidavit	Jan. 27, 1917	....., 191..
	Specification	Jan. 27, 1917	....., 191..
	Drawing 2 sheets	Jan. 27, 1917	Drawings transferred to new graph Ser. #15,693
	Photo Copies	Mar. 21, 1925	....., 191..
	First Fee Cash $15	Jan. 27, 1917	$15 Dec. 14, 1920
	First Fee cert.	....., 191..	....., 191..
	Appl. filed complete	Jan. 27, 1917	Dec. 14, 1920

Examined and Passed for Issue Mar. 18, 1920 ....., 191..
E. T. Ragan,
Exr. Div. 31. ..... Exr. Div. .....
Notice of Allowance Mar. 18, 1920 ....., 191..
By Commissioner. By Commissioner.
Final Fee Cash ....., 191.. ....., 191..
Final Fee Cert. ....., 191.. ....., 191..
Patented ....., 191..
Attorney Frank L. Belknap, 1014 1st Nat'l. Bank Bldg., Chicago, Ill.
Associate Attorney .....
(No. of Claims Allowed 4) Title as Allowed Method and Apparatus for Treating Petroleum and other Hydrocarbons (Cl. 196-25)

2767 144979

C. P. Dubbs
905 Greenleaf Avenue
Wilmette, Illinois

Los Angeles, California.
January 23rd, 1917.

(Stamp) $15 Rec'd Jan 27 1917 U. S. Patent Office

Honorable Commissioner of Patents,
Washington, D. C.

Sir:

I enclose herewith Post Office Money Order for $15.00 for filing fee of application prepared in the name of Carbon P. Dubbs, for "Method and Apparatus for Treating Petroleum Or Other Hydro-Carbons," together with two sheets of drawings.

Kindly mail all communications to me at 905 Greenleaf Ave., Wilmette, Illinois, and oblige

Very truly yours,

Carbon P. Dubbs

1

2768 144979

(Stamp) Mail Room U. S. Patent Office Jan 27 1917

PETITION

Honorable Commissioner of Patents:

Your Petitioner, Carbon P. Dubbs, a citizen of the United States, residing in Wilmette, County of Cook, and State of Illinois, whose postoffice address is 905 Greenleaf Ave., Wilmette, Illinois; prays that Letters Patent of the United States may be granted to him for new and useful Improvements in,

"Method and Apparatus for Treating Petroleum or Other Hydro-Carbons"

described and claimed in the annexed specification.

Carbon P. Dubbs

2

2769 SPECIFICATION

To All Whom It May Concern:

Be It Known that I, Carbon P. Dubbs, a citizen of the United States, residing in Wilmette, County of Cook and state of Illinois, have invented certain new and useful Improvements in Method and Apparatus for Treating Petroleum and Other Hyrdo-Carbons of which the following is a specification:

This invention relates to a method and apparatus for treating petroleum and other hydro-carbons to produce hydro-carbon products having lower boiling points than those treated.

The invention contemplates a method and apparatus whereby crude petroleum, petroleum distillates, petroleum residuum, or other like material can be placed in the apparatus and a gasoline like product produced. Other objects of the invention are: to provide a process in which the oil being treated is fractionally distilled and subjected to a cracking, breaking up, and polymerization process to convert heavier hydro-carbons or like substances into lighter, and then such changed or converted oil fractionally distilled as one uninterrupted process, and during such process, passing the vapors and gases generated back through the liquid body and incidentally thereby reducing the amount of uncondensible gases and unsaturated hydro-carbons; to provide a method and apparatus whereby more or less of the hydro-carbon treated can be converted into the

product desired. To provide a method and apparatus wherein
the heat units are utilized with the greatest efficiency; to
provide a method and apparatus in which a series of Stills and
chambers are employed and in which the hydrocarbons treated
are subjected to progressively increasing temperatures; to
provide a method and apparatus in which the vapor and gases
are subjected to progressively decreasing temperatures, the
vapors and gases being preferably allowed to percolate up through

3

2770 the various chambers and Stills, advancing from those having
the higher temperatures to those having the lower temperatures;
to provide a method and apparatus wherein the vapors, whether
the condensable vapors or the uncondensable gases, and the
liquid are caused to contact with each other in the zones of
re-action; to provide a process in which the heating elements
Per F are located outside of the converting *(STILLS) ~~retorts~~ and in which
an extreme heat can be applied to the oil without necessitating
Per F super-heating the *(STILL) ~~retort~~, to provide a press and method of
operating which is facilitated by the use of pumps.

The invention also resides in such features of construction
and such process or method features as will more fully be
hereinafter described.

* Matter in parentheses inserted.

In drawings:

Fig. 1 is a diagrammatic side elevation of my apparatus.

Per A Fig. 2 is a *(SIDE) ~~plan view section and~~ elevation of *(A PART OF) the

" A ~~and retort and condensing~~ apparatus *(WITH PARTS BROKEN AWAY AND SHOWN IN SECTION).

Fig. 3 is a detailed view showing the manner of by-
passing any retort.

Describing in detail the method with reference to the
apparatus shown in the drawings: A-1, A-2, A-3, A-4, A-5,

Per C designate the Stills ~~or retorts~~, (any number of same may be
used) in which the petroleum or other hydrocarbons to be
treated are subjected to the action of heat. B-1, B-2, B-3,
B-4 and B-5 are heating coils, positioned in a suitable furnace
for heating. The tubes "C" preferably entering manifolds
marked "D" and positioned at an angle, the flow of material
to be heated, entering at the low end of the tubes and being

Per A discharged at the highest end of the tubes, the construction
of the same being similar to any standard water tube boiler
and being provided with plugs in each manifold marked "E", so
that the tubes "C" may be readily cleaned. F-1, F-2, F-3, F-4,

4

2771 F-5 and F-6 are standard make pressure gauges. G-1,
G-2 and G-3 are temperature indicating or recording in-

* Matter in parentheses inserted.

struments. H-1, H-2, H-3, H-4 and H-5 are safety valves.
I-1, I-2, I-3, I-4 and I-5 are reflux condensers, which
also act as *(HEAT) interchangers. J-1, J-2, J-3 and J-4 are vapor
Per A pumps. K-1, and K-2 are liquid pumps. L-1, L-2, L-3 *(ARE) ~~and~~
" A ~~L-4 are~~ glass liquid guages. *(A SIMILAR GUAGE IS OF COURSE PROVIDED FOR THE
Per F ~~RETORT~~ *(STILL) A-2.) M is a condenser for cooling
the gas and vapors, which may be used as a heat intercharger,
and M-1 is a similar condenser for further cooling the vapors.
N is a vessel in which the condensed vapors and cooled gases are
" A collected. O is a pressure regulating valve. ~~K-1~~ *(K-2) is a pump
which may be used to circulate either water or oil through
the condenser M.

In operating my process the material to be treated
is forced into line 1 by power pump K-1 and from there through
line 2, then by line 3 into reflux condenser I-1, passing
around vapor pipes "P" and out through line 4 back into line 2,
valves 5 and 6 being open, while valve 7 is closed, and should
it be desired to by-pass the material to be treated around
this reflux condenser, then valves 5 and 6 would be closed
and valve 7 open, the oil traveling in this manner through or
past reflux condensers I-2, I-3, I-4 and I-5, then on through

* Matter in parentheses inserted.

line 2 to heating coil B-1 and from there through line 8 into
Per F *(STILL) ~~retort~~ A-1 by means of perforations in pipe 8, retorts A-1, A-2,
Per C A-3, A-4 and A-5 being filled up to overflow *(q)~~Q~~-1, *(q)~~Q~~-2, *(q)~~Q~~-3,
" " *(q)~~Q~~-4 and *(q)~~Q~~-5 with the liquid being treated, the oil along with
the vapors generated after passing through the heating coils
B-1, percolates up through the oil contained in the Still A-1,
" A the Still A-1 being maintained at a predetermin-*(ED)~~ate~~ temperature
and the vapors that are not condensed while percolating up
Per F through the oil in *(STILL) ~~retort~~ A-1, pass up through pipe R-1 through
" A reflux condenser I-1, through pipe *(q)Q, through pressure regulating

5
2772 valve "O" and condensers "M" and M-1 and into receiving tank
"N", from which they are delivered to suitable storage. The
vapors that are condensed in the reflux condenser I-1 are drained
Per C back into *(STILL) ~~retort~~ A-1 and the surplus unvaporized oil in *(STILL) ~~retort~~
" " A-1 overflows through overflow pipe *(q)~~Q~~-1 by means of pipe 10
into heating coil B-2, in which it is further heated up and
" " passes from said heating coil through pipe 11 into *(STILL) ~~retort~~ A-2
Per F and the gases and vapors generated in *(THE HEATING COIL) ~~furnace~~ B-2, percolate
Per F up through the oil contained in *(STILL) ~~retort~~ A-2, said retort being
Per F maintained at a higher temperature than *(STILL) A-1, and as said
Per F vapors pass up through the oil in this *(STILL) ~~retort~~, those of not

*Matter in parentheses inserted.

sufficiently low boiling point are condensed and retained in
Per C said *(STILL) ~~retort~~, while the remaining vapors pass up through pipe
R-2 and through reflux condenser I-2, through pipe 12, then
into pipe 13, valve 14 being closed and valve 15 being open,
the vapors pass down to vapor pump J-1, through line 15 into
Per C the bottom of *(STILL) ~~retort~~ A-1, through perforations in pipe 15 and
Per F percolate up through the oil contained in *(STILL) ~~retort~~ A-1, up through
reflux condenser I-1, and through pressure regulating valve
"O", through condensers "M" and M-1, into distillate and gas
receiving tank "N", from which the distillate may be continuously
or intermittently drawn, such vapors not being of sufficiently
low boiling point, are condensed as they percolate up through
Per F the oil in *(STILL) ~~retort~~ A-1 and pass up through reflux condenser I-1
and are subjected to a further treatment by overflowing to the
Per F next heating furnace and *(STILL) ~~retort~~ by means of overflowing pipe
Q-1 and this operation is followed throughout the entire apparatus.
Per C Any vapor pump and the *(STILL) ~~retort~~ it is conected therewith(,)
can be by-passed by the closing of valve 15' and opening
Insert valve 14.
C1 C1

The residue flowing from Still -A-5, or the last Still

* Matter in parentheses inserted.

2773 of the apparatus, may be re-run through the apparatus either
Per A without or without any other treatment; or it may be mixed with
a fresh supply of raw material. The oil in each succeeding
Still is maintained at a higher temperature than the preceding
Still, and as the oil passes from the first to the last Still,
it will have been subjected to progressively increasing temperatures until the desired amount of such oil has been converted into
the desired product.

It will be noticed that the raw material, in passing
through the apparatus, has been subjected in the various
Stills and heating coils, to a progressively increasing
temperature, while the vapors and gases given off, have been
caused to percolate up through the liquid contained in the
Stills and are caused to mix with such liquid in zones of
re-action and said vapors and gases made to travel in the
reverse direction from the liquid, so as to subject said gases
and vapors to a progressively decreasing temperature. This
arrangement permits the vapors and gases to be subjected to
comparatively high and low temperatures without excessive pressure,
while the vapors in their final form, as they pass to the
condenser, have been scrubbed through the liquid and their

* Matter in parentheses inserted.

Per C temperature greatly reduced*(.) ~~so that as~~ *(AS) they pass from the Still
A-1, to the condenser, they are at a relatively low temperature *(AS COMPARED)
" " to that *(TO) ~~at~~ which they *(ARE) ~~have been~~ subjected ~~to~~ in the farthest
Still *(A-5).

This novel method of treatment will tend to prevent
any heavy vapors, or such vapors which have not been sufficient-
ly treated, from passing to the condenser since the step-down
in temperature, as the vapors and gases pass through the
various Stills towards the condenser, will tend to condense
any heavy vapors and cause them to be carried back with the
residuum and again subjected to the higher temperature. Another

7

2774 material advantage of this method of treatment lies in the
fact that the vapors and gases being stepped down in tempera-
ture by percolating through the liquid in the successive
Stills having lower temperature, the heat units which are
extracted in cooling the vapors and gases are transmitted to
the liquid which is traveling in the reverse direction and
is stepping up in temperature. By heating the oil in the heat-
ing furnaces, such oil can be heated to a much higher
Per C temperature than the oil contained in the *(STILLS) ~~retorts~~ and it will
be noted that the oil can be by-passed around any heating

* Matter in parentheses inserted.

coil, suitable valves being provided for this, and the
Per F temperature of any *(STILL) ~~retort~~ be regulated independent of any
Per C of the other *(STILLS THUS) ~~retorts and~~ utilizing, to the highest degree, the heat units given up by the vapors, gases and also from the oil coming from the heating coils.

From the above description, it will be apparent that the raw material is first preheated by the heat units extracted in cooling the heated vapors and gases as they pass through the reflux condensers. Second, that the heat units are extracted from the oil, gases and vapors generated in the heating coils as same percolate up through the oil contained
Per F in the *(STILLS) ~~retorts~~. Third, that the materials treated is progressively subjected to increasing temperatures while maintaining any desired pressure on the vapors and gases generated, and that the resultant vapors and gases are caused to travel in the reverse direction, that is, through progressively decreasing temperatures, while caused to percolate up through the liquid, so that the liquid, vapors and gases are present in the zones
3 of re-action, and the vapors and gases progressively advance
Per C *(INTO) ~~towards~~ the Still*(S) or through a proportion of the apparatus
Insert having a lower temperature.
A[1] A[1]

8

* Matter in parentheses inserted.

2775 While I have shown and described a particular apparatus for carrying out my method, the latter is not limited to use with the particular apparatus shown and described. Also various changes in the details of construction and connections and operations of the apparatus can be made within the scope of my invention.

Insert C²>

2776 I Claim As My Invention: 9

~~1. A process of distilling petroleum to produce lower boiling point hydro-carbons, which consists in passing the material through a series of receptacles to pre-heat the material, passing the pre-heated material through a plurality of independently direct heated coils, passing the material through retorts, in its passage from one coil to another, taking off vapors from any given retort, maintaining a vapor pressure throughout the system sufficient to convert a substantial portion of the oil into low boiling point hydro-carbons.~~

~~2. A process of distilling petroleum to produce lower boiling point hydro-carbons, which consists in passing the material through a series of receptacles to pre-heat the material, passing the pre-heated material through a plurality of independently direct heated coils, passing the material through retorts in its passage from~~

~~one coil to another, taking vapors off of the retorts and~~
~~passing them back through the oil, finally taking~~
C^3 ~~off the~~
Sub ~~A^2~~ ~~vapors and maintaining the pressure of the system.~~
C^3
Insert B^1 >

Carbon P. Dubbs.

2777 OATH. 10

State of Illinois, } ss.
County of Cook. }

Carbon P. Dubbs, the above named petitioner, being first duly sworn, deposes and says that he is a citizen of the United States, residing in Wilmette, County of Cook and State of Illinois; that he verily believes himself to be the first original and sole inventor of the new and useful Improvements in:

Method and Apparatus for Treating Petroleum or Other Hyrdocarbons

described and claimed in the annexed specification; that he does not know and does not believe that the same was ever known or used before his discovery thereof, or patented or described in any printed publication in any country before his invention or discovery thereof, or more than two years prior to this application, or in public use or on sale in the United States for more than two years prior to this application; that said invention has not been patented in any country foreign to the United States on an application filed by him, or his legal representatives, or assigns, more than twelve months prior to this application, and that no application for patent on said improvement has been filed by him, or his legal representatives, or assigns, in any country foreign to the United States.

Carbon P. Dubbs.

Sworn To And Subscribed Before Me This 22nd Day Of January, 1917.

(Seal)

H. V. Hoffman,
Notary Public.

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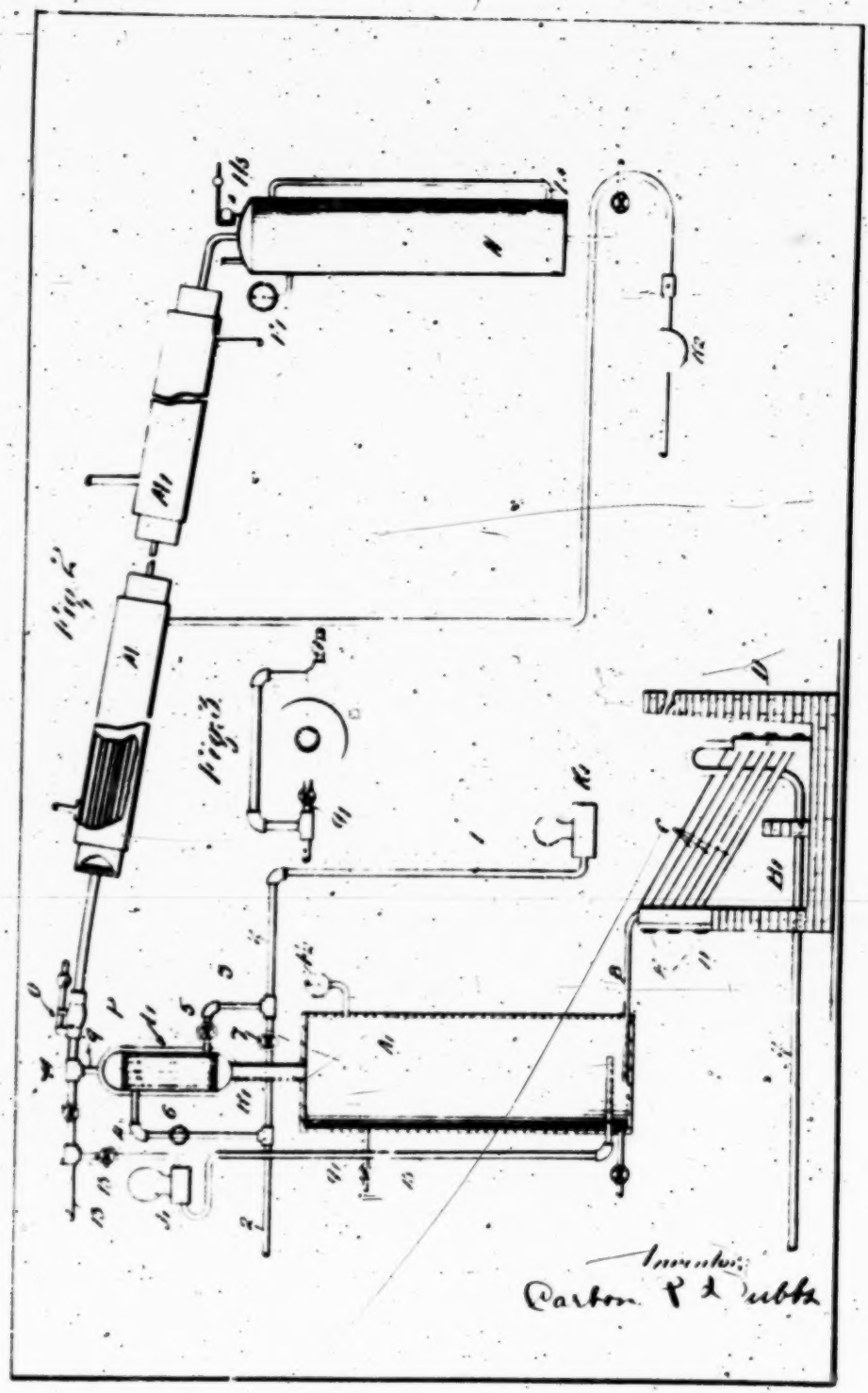

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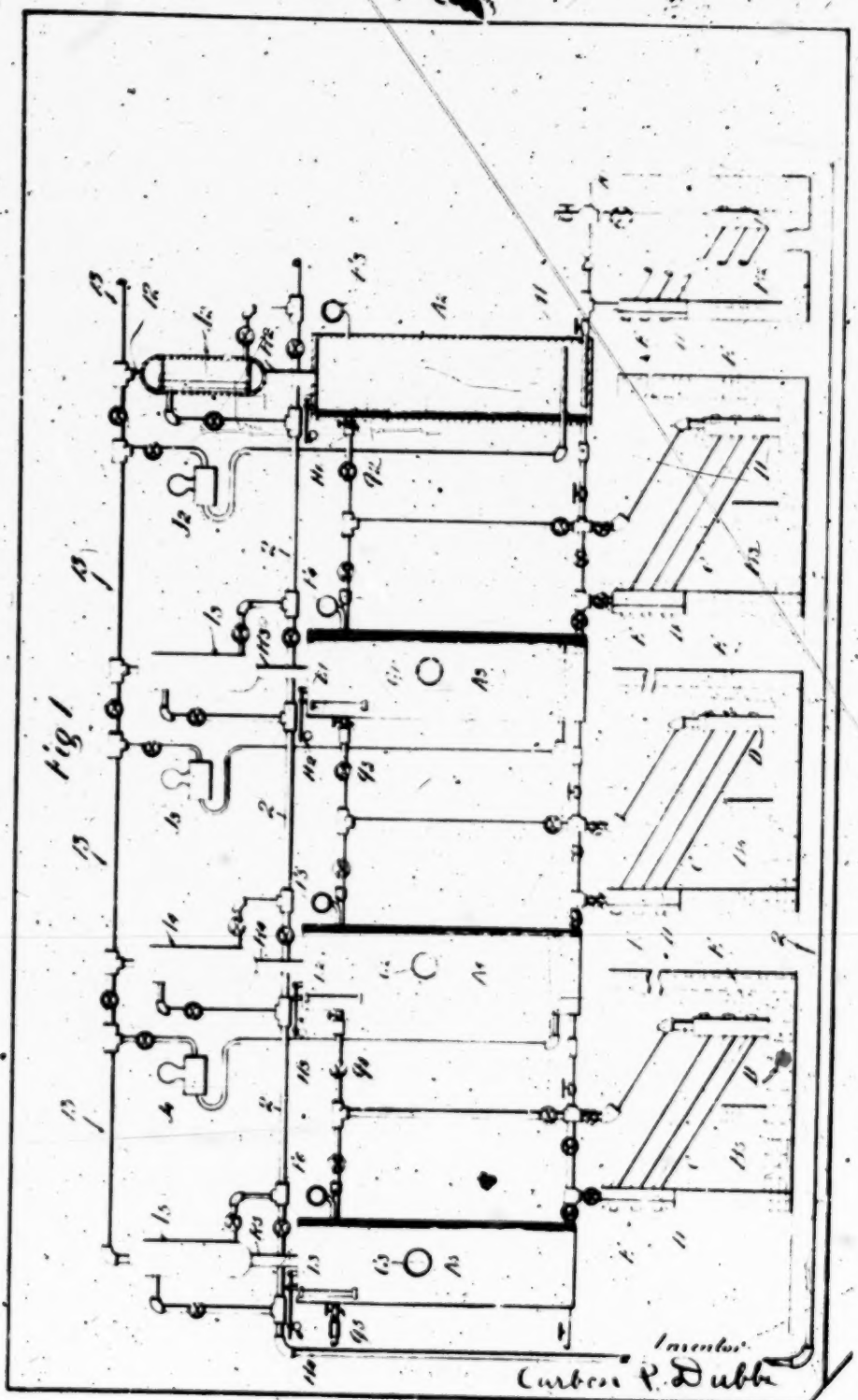

Fig 1

Inventor
Carbon P. Dubbs

522,397

2780 UNITED STATES PATENT OFFICE.

(Stamps) Mail Room Apr 7 1917 U. S. Patent Office.
Apr 7 1917 U. S. Patent Office.

In re Application of
Carbon P. Dubbs
Method and Apparatus for Treating
Petroleum and Other Hydrocarbons

Filed January 27, 1917
Ser. No. 144,979

Hon. Commissioner of Patents,
Washington, D. C.

Sir:

In the above entitled application I hereby appoint Frank L. Belknap, 1014 First National Bank Building, Chicago, Illinois, my attorney with full power of substitution and revocation, to prosecute this application, to make the necessary alterations and amendments therein, to receive the Patent and to transact all business in the Patent Office connected therewith.

Signed at Chicago, Illinois this 5th day of April, 1917.

Carbon P. Dubbs.

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2781 Div. 31, Room 169

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

Paper No. 3

All communications respecting this application should give the serial number, date of filing, title of inventions and name of the applicant.

DEPARTMENT OF THE INTERIOR

United States Patent Office

Washington

May 4, 1917.

(Stamp) U. S. Patent Office May 4 1917 Mailed.

Frank L. Belknap,

1014 First Natl. Bank Bldg.,
Chicago, Ill.

Please find below a communication from the Examiner in charge of the application of Carbon P. Dubbs, No. 144,979, filed Jan. 27, 1917, Method and Apparatus for Treating Petroleum and Other Hydro-Carbons.

Thomas Ewing,
Commissioner of Patents.

The oath is defective in that the notary did not have jurisdiction. A new oath is required.

Page 2, line 16-17, Fig. 2 appears to be an elevation with parts in section and is not a plan view. Line 29, change "highest" to high.

Page 3, line 7, reference character L-4 is not shown on the drawing. Line 11, should not K-1 be K-2? Line 22 change "condenser" to condensers. Line 29, change "predeterminate" to predetermined. Line 32 change 9 to 9.

Page 4. lines 15, 16, 17 and 30, the numeral 15 refers to two parts, namely, a valve and a pipe. Different reference characters should be used to designate these parts.

Page 5, line 2, the expression "without or without" should be corrected.

The temperatures and pressures under which the system operates are essential and should be given.

Claim 1 is rejected on—

Stewart, 1,163,570, Dec. 7, 1915, 196-13.

Claim 2 is rejected on Stewart in view of—

British, Groeling, 10,213, Apr. 30, 1913, 196-25, (1 sheet).

It is believed that in view of Groeling's disclosure it would not amount to invention to lead the vapors produced in one effect, as shown by Stewart, into the next succeeding one.

Ely,
Examiner.

HCB

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2782 Paper No. 4.

IN THE UNITED STATES PATENT OFFICE.

In re application of
Carbon P. Dubbs,
Method & Apparatus for Treating Petroleum or Other Hydrocarbons.

Filed, Jan. 27th, 1917,
Ser. No. 144,979

Hon. Commissioner of Patents,
Washington, D. C.

Sir:

In response to Office Action of May 4, 1917, kindly amend the above application as follows:

Page 2, line 16 and 17, rewrite the description of Fig. 2 as follows: "Fig. 2 is a side elevation of a part of the apparatus with parts broken away and shown in section."

Same page line 29, change "highest" to "high".

Page 3, line 6, after "L-3" change "and" to "are".

Line 7, cancel "L-4 are". Same line, after "gauges" insert "A similar gauge is of course provided for the (STILL) ~~retort~~ A-2". Line 11, change "K-1" to "K-2".

Page 3, line 22, change "condenser" to "condensers",

Per F

and change, in line 29, "predeterminate" to "predetermined". Line 32, change "9" to "q".

Page 4, line 15, change "15" to "15'" and will the Examiner kindly make the same change in the drawing in Fig. 2.

Page 5, line 2, change "without" (first time) to "with".

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2783 Page 6, line 31, add the following sentence: "The
A[1] pressure may vary from 50 pounds per square inch to several
hundred pounds per square inch and the temperature of the oil
may vary from 500 F. to 1500 F. as conditions require."

Cancel the claims now in the case and substitute the following:

1. A process of treating petroleum oil to convert
Per F heavy into *(LOWER) ~~lighter~~ boiling point hy-
A[2] drocarbons which consists
in passing the material through a series of independently
heated inclined tubes, passing material from each set of
tubes into a retort located outside of the fire zone, passing
Per B the oil successively from one retort to another
*(INTO) ~~at~~ the *(LOWER) ~~upper~~
" B parts of the latter, taking off vapors from each retort and
" B passing ~~part of~~ the vapors, after they have been taken off from
" B the retort, back to the lower end of ~~such~~ *(THE NEXT) retort and there
bringing them into intimate and direct contact with the oil
in such retort.

2. A process of treating petroleum oil to convert
Per F heavy into *(LOWER) ~~lighter~~ boiling point hydrocarbons which consists

*Matter in parentheses inserted.

in passing the material through a series of independently
heated tubes, passing the material from each set of tubes
into a retort, passing the oil successively from one retort
" B to another *(INTO) ~~at~~ the *(LOWER) ~~upper~~ parts of the latter, taking off vapors
" B from each retort and passing ~~part of~~ the vapors, after they have
" B been taken off from the retort, back to the lower end of *(THE NEXT) ~~such~~
retort and there bringing them into intimate and direct contact
with the oil in such retort.

Insert B[1]

REMARKS.

The new claims submitted have been rewritten after a

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2784 careful examination of the references cited. In view of the claims as rewritten, it is not thought that any specific discussion of the references is necessary at this time. The Examiner apparently relies principally on the Stewart patent which merely shows the interchanging heat contained in part of the oil and vapors with another part of the oil, which latter part of the oil is in separate pipes or stills.

Will the Examiner kindly enter the new oath herewith.

Respectfully submitted,
F. L. Belknap.

Chicago, Illinois.
April 22, 1918.

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2785 In re application of
Carbon P. Dubbs,

Method and Apparatus for Treating Petroleum or Other Hydrocarbons,

Ser. No. 144,979,
Filed, Jan. 27, 1917.

OATH.

State of Illinois }
County of Cook } ss.

Carbon P. Dubbs, the above named petitioner, being first duly sworn, deposes and says that he is a citizen of the United States, residing in Wilmette, County of Cook and State of Illinois; that he verily believes himself to be the first, original and sole inventor of the new and useful improvements in

Method and Apparatus for Treating Petroleum or Other Hydrocarbons

described and claimed in the above mentioned specification; that he does not know and does not believe that the same was ever known or used before his discovery thereof, or patented or described in any printed publication in any country before his invention or discovery thereof, or more than two years prior to this application, or in public use or on sale in the United States for more than two years prior to this application; that said invention has not been patented in any country foreign to the United States on an application filed by him, or his legal representatives, or assigns, more than twelve months prior to this application, and that no application for patent on said improvements has been filed by him, or his legal representatives, or assigns, in any country foreign to the United States.

Carbon P. Dubbs.

Subscribed and sworn to before me this 19th day of April, 1918.

(Seal)

J. M. Lutz,
Notary Public.

2786 Div. 31 Room 169

Address only "The Commissioner of Patents, Washington, D.C.," and not any official by name.

Paper No. 5

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

B/AMT

DEPARTMENT OF THE INTERIOR

United States Patent Office

Washington

May 9, 1918

(Stamp) U. S. Patent Office May 9 1918 Mailed.

Frank L. Belknap

1014 First National Bank Bldg.
Chicago, Ill.

Please find below a communication from the Examiner in charge of the application of Carlon P. Dubbs, filed Jan. 27, 1917, serial No. 144,979, for Method and Apparatus for Treating Petroleum and other Hydrocarbons.

James T. Newton,
Commissioner of Patents.

This case has been reconsidered as amended April 25, 1918.

Page 4, line 30, change "15" to —15'—.

Claim 1, lines 6 and 7 and claim 2, line 6, change "at the upper parts" to —into the lower part—.

Claim 1, line 8, and claim 2, line 7, cancel "part of".

Claim 1, line 9, and claim 2, line 8, change "such" to —the next—.

The claims appear allowable in substance.

Grindle,
Examiner.

2787 Paper No. 6.

February 14, 1919.

Phelps & Barrett,
Washington, D. C.

Dear Misses:

Please secure for me a copy of the last Office Letter in the application of Dubbs, Serial #144,979, pending in Room 172.

Yours truly,
Frank L. Belknap.

JMS/SC

Approved:
G. A. Lovett,
Exr.

19

2788 Paper No. 7.

(Stamp) Mail Room Feb 27 1919 U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

In re Application of
Carbon P. Dubbs,
Method & Apparatus for Treating
Petroleum or Other Hydrocarbons

Serial #144,979
Filed, Jan. 27, 1917.

Hon. Commissioner of Patents,
Washington, D. C.

Sir:

In response to Office Action of May 9, 1918, kindly amend the above application as follows:

Page 4, line 30, change "15" to —15'—.

Claim 1, line 6 and 7, claim 2, line 6, change "at the upper parts" to —into the lower part—.

Claim 1, line 8, claim 2, line 7, cancel "part of".

Claim 1, line 9, claim 2, line 8, change "such" to —the next—.

Add the following claim:

b. C³ *3. A process of treating petroleum oils to convert heavy into lighter boiling point hydrocarbons which*

B¹ *consists in passing the material through a heating coil*
heated in a cracking zone, passing the material into a vapor
chamber, removing the vapors from the vapor chamber and con-
densing a portion thereof and returning said condensed por-

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2789 *tion to the inlet side of the heating coil through a path outside of and distinct from the vapor chamber.*

REMARKS.

The new claim added clearly reads in the drawings and is novel over any art cited and clearly reads on the original disclosure.

Respectfully,
Frank L. Belknap.

Chicago, Illinois,
Feb. 25, 1919.

1918 *PX 848.*

2790 2—260

Div. 31 Room 169

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

Paper No. 8

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

L/AMT

(Stamp) U. S. Patent Office Mar 5 1919 Mailed.

DEPARTMENT OF THE INTERIOR

United States Patent Office

Washington

March 5, 1919

Frank L. Belknap
1014 First National Bank Bldg.
Chicago, Ill.

Please find below a communication from the Examiner in charge of the application of Carbon P. Dubbs, filed Jan. 27, 1917, serial No. 144,979, for Method and Apparatus for Treating Petroleum and other Hydrocarbons.

James T. Newton,
Commissioner of Patents.

Considered as amended February 27, 1919.

A review of the specification discloses a number of details which require correction. In the title and throughout the first page and a half of the specification the invention is described as including apparatus. The claims being limited to a process the specification should be revised to correspond.

The overflow connections for the "stills", A', etc., are indicated on the drawing by small letters; in the specification by capitals. The indications should agree.

Page 4, lines 29 to 31, valves 15' and 14 are mentioned as used in connection with each retort. Said characters are

applied, however, only to the valves associated with retort A'.

The use indiscriminately of "retort" and "still" to designate containers A', A^2, etc. is confusing and somewhat inaccurate. Since some distillation occurs in these containers they may possibly be stills, but it is not seen how they can be properly designated as retorts.

Page 5, line 19, "and low. temperatures" seems to have no significance in the connection in which it is used. Lines

22

2791 23 and 24 are grammatically confused.

Page 6, lines 13 to 15 are not connected properly to the remainder of the sentence. In line 20, "oil" should apparently be canceled. In line 30, "towards the still" is not clear.

The amendment inserted on page 6, line 31 is quite insufficient to give one skilled in the art the necessary information to practice the process. What are the temperatures of the various stills and coils, or the temperature differences between them? What are the conditions which may require a temperature of 500° at one time and 1500° at another, or a variation of several hundred pounds in pressure? What are the optimum conditions as to feed, pressures, and temperatures for some specified material? Applicant will no doubt recognize the fact that accurate details as to working conditions are of extreme importance in this art.

The description is deficient as to the pipe connections and valves shown in connection with the stills. Numerous details are shown but not described, and their use not indicated.

Owing to the insufficiency of the disclosure, as pointed out above, it is deemed necessary to reject claims 1 and 2 on this ground.

Claim 3 is not seen to be readable at all on applicant's disclosure. If applicant desires to make claims of this character it will be necessary to insert in the specification a clear basis for the claimed subject-matter, if the existing disclosure is deemed to warrant such basis. The claim is therefore rejected as not warranted by the specification.

Claim 3 is, however, clearly unpatentable in view of the

prior art. The following patents may be cited on which the claim is rejected:

	1,138,260, Testelin et al.,	May 4, 1915,	196-32
	1,226,990, Parker, (filed Apr. 4, 1916)	May 22, 1917,	" "
	1,281,884, Trumble, (filed July 19, 1915)	Oct. 15, 1918,	196-31
	1,170,884, Edwards,	Feb. 8, 1916,	196-14
(French)	417,532, Kittle,	Nov. 16, 1910,	196-31.

G. A. Lovett,
Examiner.
23

2792 Paper No. 9.

(Stamp) Mail Room Mar 1 1920 U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE.

In re Application of
Carbon P. Dubbs,
Method and Apparatus for Treating
Petroleum or Other Hydrocarbons,

Serial No. 144,979,
Filed, Jan. 27, 1917.

Hon. Commissioner of Patents,
Washington, D. C.

Sir:

In response to Office Action of March 5, 1919, kindly amend the above application as follows:

Page 2, line 22, cancel "or retorts".

Page 3, lines 25 and 26, change all of the capital "Q's" to small "q's". Line 32, change "Q" to "q".

Page 4, line 4, change "retort" to still in both cases. Line 5, change "Q-1" to q-1. Lines 7, 13, 17 and 29, change "retort" to still. Line 31, change the period to a comma and add "corresponding valves being situated above (STILLS) ~~retorts~~ A-2, A-3, A-4 and A-5."

Per F
C[1]

Page 5, line 22, place a period after "reduced", cancel "so that" and capitalize "as". Line 23, add "as compared" to the end of the line. Line 24, change "at" to to, change "have been" to are and cancel "to" after "subjected". Line 25, add "A-5" after "still".

Page 6, line 9, change "retorts" to stills. Line 13, change "retorts and" to stills thus. Line 30, change "towards" to into and add s to "still".

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2793 Please add the following illustrative run to the end of the specification.

"Taking gas oil from a mid-continent field and pre-
heating same by passing it through dephlematator as explained,
then supplying it to the first heating zone where it is sub-
C² jected to a heat of approximately 400° and a pressure of
from 100 to 150 pounds, thence rising into the retort A-1 and
proceeding through the subsequent heating and distilling zones
as described, being subjected to a heat of approximately 550°
in the second heating zone, 600° in the third heating zone,
700° in the fourth and 700° in the fifth heating zone, about
50% high boiling point distillate may be obtained therefrom.
By redistillation of this distillate, about 50% gasoline or
hydrocarbons of approximately the same boiling point may be
obtained."

Cancel claim 3 and add the following claims:

3—a process of treating petroleum oil to convert heavy
Per F into *(LOWER) ~~lighter~~ boiling point hydrocarbons, consisting in preheating

*Matter in parentheses inserted.

C³ the oil by passing it as a cooling agent through reflux condensers, causing the preheated oil to pass through a series of units of inclined heating tubes arranged alternatively with dephlegmating stills positioned outside of the fire zone, directing the oil from a heating zone to a still, the overflow oil from each still caused to pass to the succeeding heating Per F zone and thence to the succeeding still, ~~by~~ *(IN) injecting the vapors therefrom into the lower part of the still and there again subPer F jecting *(SAID VAPORS) ~~it~~ to a dephlegmating action, directing the vapors from the still to reflux condensers, returning a portion of said vapors to be retreated in the stills and subjecting the re-

25

2794 mainder to condensation.

4—In an apparatus for treating petroleum oil to conPer F vert heavy into *(LOWER) ~~lighter~~ boiling point hydrocarbons, the combination with a series of heating units alternately arranged with dephlegmating stills, of reflux condensers situated above the stills and adapted to receive the vapors therefrom, means for preheating the oil charge in the reflux condensers, means for directing the preheated oil to the initial heating unit, pipe connections between said heating units, stills and reflux condensers for directing the oil and vapors successively through the alternately arranged heating units and stills, means for

* Matter in parentheses inserted.

Per H | supplying the cracked oil from the heating
*(UNITS) ~~zone~~ to the bottom
of the stills and there intimately intermingling it with the oil
in the still, return pipes *(FOR LEADING VAPORS FROM THE TOP OF ONE STILL)
to the bottom of the *(NEXT PRECEDING) stills and draw-
off pipes to a condenser connected to the reflux condensers,
valves interposed in the lines adapted to cut out any heating
unit or retort from the apparatus.

Insert D[1]

REMARKS

The words "and low temperature" appearing in line 19 of page 5 together with "comparatively high" appearing in the beginning of same line show that the vapors in their travel through the system are subjected to quite a range of temperature and in view of this fact I believe are justified. The insufficiencies in disclosure having been herewith supplied, claims 1 and 2 are now deemed allowable as previously stated in the first action by the Examiner.

After a careful reading of the art I have drawn a

26

2795 third process claim and an apparatus claim which I think are distinguished therefrom.

Respectfully submitted,

Frank L. Belknap.

Chicago, Ill.,
Feb. 25, 1920.

27

1924 *PX 846.*

2796 2—181

AMT-Div. 31

Address only

The Commissioner of Patents,
Washington, D. C.

Serial No. 144,979

DEPARTMENT OF THE INTERIOR

United States Patent Office

Washington

March 18, 1920

Carbon P. Dubbs.

Sir: Your Application for a patent for an Improvement in Method and Apparatus for Treating Petroleum and other Hydrocarbons, filed Jan. 27, 1917, has been examined and Allowed.

The final fee, Twenty Dollars, must be paid not later than Six Months from the date of this present notice of allowance. If the final fee be not paid within that period, the patent on this application will be withheld, unless renewed with an additional fee of $15, under the provisions of Section 4897, Revised Statutes.

The office delivers patents upon the day of their date, and on which their term begins to run. The printing, photolithographing, and engrossing of the several patent parts, preparatory to final signing and sealing, will require about four weeks, and such work will not be undertaken until after payment of the necessary fee.

When you send the final fee you will also send, Distinctly And Plainly Written, the name of the Inventor, Title of Invention, And Serial Number As Above Given, Date Of Allowance (which is the date of this circular), Date Of Filing, and, if assigned, the Names Of The Assignees.

If you desire to have the patent issue to Assignees, an assignment containing a Request to that effect, together with the Fee for recording the same, must be filed in this office on or before the date of payment of final fee.

After issue of the patent uncertified copies of the drawings and specifications may be purchased at the price of Ten Cents Each. The money should accompany the order. Postage stamps will not be received.

Final fees will Not be received from other than the applicant, his assignee or attorney, or a party in interest as shown by the records of the Patent Office.

Respectfully,

James T. Newton
Commissioner of Patents.

Frank L. Belknap
1014 First Nat'l Bank Bldg.
Chicago, Ill.

(In left-hand margin) ☞ In Remitting the Final Fee Give the Serial Number at the Head of This Notice.
(In right-hand margin) ☞ Uncertified Checks Will Not Be Accepted.

28

Amdt. D

2797 (Stamp) Mail Room U. S. Patent Office Dec 14 1921.

IN THE UNITED STATES PATENT OFFICE.

Div. 31, Room 169,
Carbon P. Dubbs,
Method and Apparatus for Treating
Petroleum or Other Hydrocarbons,
Filed Jan. 27, 1917,
Serial No. 144,979,
Allowed March 18, 1920.
Hon. Commissioner of Patents,
Sir:

In the matter of the above entitled application, kindly add the following claims:

5. A process of cracking petroleum oils, comprising passing the oil in a relatively small
D[1] stream through a furnace *(,) in directing the heated oil
Per F to a plurality of separate serially connected *(STILLS) ~~retorts~~
Per F to pass successively through said *(STILLS) ~~retorts,~~ in heating
the oil while passing from the ~~first to the last~~
Sub F[1] ~~stage~~ F[1]

*Matter in parentheses inserted.

~~retort,~~ in passing vapors generated in certain *(TO THE STILLS) ~~retorts~~
through other ^ ~~retorts to one of the retorts,~~ in
Sub F² F²
Per F charging the vapors from *(VAPOR RECEIVING AND DISCHARGING STILLS) ~~said vapor receiving retort~~ into
a dephlegmator, in passing uncondensed vapors from the
dephlegmator to a condenser for condensation and collection, in returning oil constituents from the
Per F dephlegmator to the *(STILLS) ~~retorts~~ for retreatment, and in
maintaining the oil while undergoing distillation under

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2798 a substantial vapor pressure produced from vapors of
the oil.

6. A process for cracking petroleum oil which comprises forcing the oil continuously in a
small stream through a furnace, in passing the heated
oil through a series of separate serially connected ^ ~~retorts,~~ in heating the oil while travelling from
Sub F³ F³
the
Per F ~~first~~ *(INITIAL) to the last stage *(STILL) ~~retort~~, in passing vapors generated
Per F in certain *(STILLS) ~~retorts~~ into one of the other ~~retorts~~ *(STILLS), ^ in
Insert F⁴ F⁴
Per F discharging vapors from said vapor receiving *(AND DISCHARGING STILL) ~~retort~~
to a dephlegmator, in passing uncondensed vapors from
the dephlegmator to a condenser for condensation and
collection, in returning oil constituents from the
Per F dephlegmator to *(ONE OF SAID STILLS) ~~an early stage~~ retort for passage through

* Matter in parentheses inserted.

subsequent *(STILLS) ~~retorts~~ for retreatment, and in maintaining
the oil undergoing distillation under a substantial vapor
pressure produced from vapors generated from the oil.

7. A process for cracking petroleum
Per F oil, which comprises preheating oil *(BY) ~~from~~ heat extracted
from heated oil constituents and then forcing the oil in
a small stream through a furnace, in passing the heated
oil through a plurality of separate serially connected
Per F *(STILLS) ~~retorts~~, in heating the oil while travelling from the
Per F first to the last *(STILL) ~~stage retort~~, in passing vapors generated
Per F in certain *(STILLS) ~~retorts~~ through other *(STILLS) ~~retorts~~ to one of the
Per F *(STILLS) ~~retorts~~ constituting a ~~vapor~~ receiving *(VAPOR AND DISCHARGE STILL) ~~retort~~, in
Per F. passing the vapors from said vapor receiving *(AND DISCHARGE STILL) ~~retort~~ to a
30
2799 dephlegmator, in discharging the uncondensed vapors
from the dephlegmator to a condenser, in returning
Per F oil constituents from the dephlegmator to *(ONE OF SAID STILLS) ~~an early~~
Per F ~~stage retort~~ for passage through other *(STILLS) ~~retorts~~ for
retreatment, and in maintaining the oil while undergoing
treatment in the system under a substantial vapor pressure produced from vapors generated from the oil.

8. An apparatus for cracking hydrocarbon oil, comprising a furnace, means for conveying oil in

* Matter in parentheses inserted.

a relatively small stream through the furnace, a plurality
Per F of independent serially connected vertical *(STILLS) ~~retorts~~,
means for introducing oil from the furnace to one of
Per F said *(STILLS) ~~retorts~~ to pass successively through other *(STILLS) ~~retorts~~,
means for heating the oil during its passage from the
first to last retort, means for causing vapors generated
Per F in certain of the *(STILLS) ~~retorts~~ to be introduced to one of the
Per F *(STILLS) ~~retorts~~, a reflux condenser, means for discharging said
vapors from the vapor receiving *(STILL) ~~retort~~ to said condenser,
means for returning oil constituents from the reflux
Per F condenser to one of the *(STILLS) ~~retorts~~, a means for maintaining
a vapor pressure on the oil undergoing treatment.

9. The process of cracking petroleum
Per F oil which comprises preliminarily heating the oil *(BY) ~~from~~
heat extracted in cooling heated vapors and gases, in
then passing the oil in a small stream through a furnace,
Per F in discharging the heated oil into a *(STILL) ~~retort~~ to pass
successively therethrough and through a series of independent connected *(STILL) ~~retorts~~, in heating the oil while
Per F travelling from the first to the last stage *(STILLS) ~~retort~~,

2800 in passing vapors generated in certain *(STILLS)
Per F ~~retorts~~
Per F through other *(STILLS) ~~retorts~~ into one of the *(STILLS) ~~retorts~~ con-

* Matter in parentheses inserted.

Per F stituting a vapor receiving *(AND DISCHARGE STILL) ~~retort~~, in discharging

Per F vapors from said vapor receiving *(AND DISCHARGE STILL) ~~retort~~, in subject-
my the vapors to a reflux condensation, in returning

Per F oil constituents to the *(STILL) ~~retorts~~ for retreatment by
passage therethrough, in discharging uncondensed vapors for condensation and collection, and in main-
taining the oil while undergoing distillation under a substantial vapor pressure produced from vapors generated from the oil.

Insert E1>

The foregoing claims have been presented to bring out a novel step in the applicant's process, and in their present form are clearly allowable. It is new with this applicant to first heat vapors by extracting heat from heated constituents of oil, to then pass the vapors in a small stream through a furnace, and finally through the successive independent retorts. There is no prior art which shows the idea of first passing the vapors in small streams through a furnace, and then through the succeeding communicating retorts. The applicant has found that such a treatment of the oil produces the most beneficial results probably due to the fact that the passage of the oil in the small stream through the coil properly heats the same to cause the desired cracking thereof during its passage through the plurality of interconnected vertical retorts. The present invention constitutes a marked improvement over the applicants own prior process patent 1231509, and it is believed that the Examiner will pass the application to 32
2801 allowance with the present claims.

In reviewing the prior art attention is called to the fact that in Edwards there is no disclosure of a plurality of interconnected retorts receiving the heated oil, so that said oil is properly cracked in stages under the desired and proper temperatures and pressures after being received from the heating coil. In Edwards the entire heating takes place in the coils 1 and the other chambers such as chambers

* Matter in parentheses inserted.

8 and 26 are condensation receptacles. This is likewise true of Trumble, Stewart and the patent to Von Groeling. Attention is called to the fact that in Von Groeling the oil is heated in a large boiler, which is certainly not in a small stream, the vapors passing from the boiler through the tubes F, there being no bulk supply of oil in these tubes so that only vapors are introduced thereto.

Respectfully submitted,

Carbon P. Dubbs,
By Frank L. Belknap
Attorney.

Dec. 7, 1921.
C. M. T.

33

2802 Rec'd Dec 14 1921 U. S. Pat. Office
Renewal ~~& Arndt~~ Paper No. 11 Jan 21 1922
Please Enter.

IN THE UNITED STATES PATENT OFFICE.

Div. 31, Room 169,
Carbon P. Dubbs,
Method and Apparatus for Treating
Petroleum or Other Hydrocarbons,
Filed Jan. 27, 1917,
Serial No. 144,979,
Allowed March 18, 1920.

RENEWAL.

Hon. Commissioner of Patents,

Sir:

Your petitioner, Carbon P. Dubbs, a citizen of the United States and resident of Wilmette, in the County of Cook, and State of Illinois, whose postoffice address is 905 Greenleaf Avenue, Wilmette, Illinois, represents that on January 27, 1917, he filed an application for Letters Patent for an improvement in Method and Apparatus for Treating Petroleum or Other Hydrocarbons, Serial No. 144979, which application was allowed March 18, 1920, but that he failed to make payment of the final fee within the time allowed by law. He now makes renewed application for Letters Patent for said invention, and prays that the orig-

inal specification, oath, and drawings may be used as a part of this application.

Signed at Washington, D. C., this 9th day of December, 1921.

Carbon P. Dubbs,
By Frank L. Belknap
Attorney.
34

2803 (Stamps) Mailing Room U. S. Patent Office Jan 24 1922 Application U. S. Patent Office Jan 17 1922 Paper No. 12 Mar 1922 Division 31.

IN THE UNITED STATES PATENT OFFICE.

Re Application of
Carbon P. Dubbs,
Method and Apparatus for Treating
Petroleum and Other Hydrocarbons,
Filed Jan. 27, 1917,
Serial No. 144,979,
Allowed March 18, 1920.

SUPPLEMENTAL AMENDMENT.

Hon. Commissioner of Patents,

Sir:

It is respectfully requested that the following claims be added for the consideration of the Examiner:

Per E / Per F / Insert F⁵

*(10.) *6.* An improvement in the art of cracking petroleum oils, which consists in *(DISTILLING) ~~*vaporizing*~~ oil under pressure *(BY HEATING THE SAME WHEN IN A SMALL STREAM), in passing vapors produced by such distillation through a plurality of separated bodies of petroleum oil of progressively different temperatures *F⁵ so as to purify the vapors and condense the heavier fractions without condensing the lighter vapors, in

* Matter in parentheses inserted.

collecting the vapors which escape condensation by passage
through said bodies of oil, and in subjecting such vapors
to condensation and collection to provide a gasoline like
hydrocarbon.

*(11) ~~6.~~ The process of cracking
Per F petroleum oil, which comprises *(DISTILLING) ~~vaporizing~~ oil under
Insert F⁶ pressure *F⁶ in passing the vapors through a series of

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2804 separate liquid bodies of petroleum oil maintained at
temperatures sufficient to condense heavier fractions
of the vapors without condensing the lighter fractions,
the said liquid bodies of oil discharging one into
Insert F⁷ the other *F⁷ in collecting the vapors escaping condensation
in said liquid bodies, and in subjecting said vapors to
condensation and collection.

*(12) ~~7.~~ The process of cracking
Per F petroleum oil, which comprises *(DISTILLING) ~~vaporizing~~ oil under
Insert F⁸ pressure, ^ F⁸ in passing the vapors through a
series of
separate liquid bodies of petroleum oil maintained at
temperatures sufficient to condense heavier fractions
of the vapors without condensing the lighter fractions,
the said liquid bodies of oil discharging one into the
Insert F⁹ other, ^ F⁹ in collecting the vapors escaping condensation

* Matter in parentheses inserted.

in said liquid bodies, and in subjecting said vapors
to condensation and collection, and in maintaining
the entire system including the final condenser under
pressure.

*(13) ~~8.~~ The process of cracking
Per F petroleum oil, which comprises *(DISTILLING) ~~vaporizing~~ petroleum
Insert F10 oil ^ ~~by heat and pressure,~~ ^ F10 in passing the vapors
through a plurality of pools of oil of different
Insert F11 temperatures, ^ F11 all of said oil pools being of a
sufficient temperature to cause a condensation of the heavy vapors without condensing the lighter oil vapors, and in discharging the light oil vapors for final condensation and collection.

*(14) ~~9.~~ The process of cracking
petroleum oil which comprises continuously heating a

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2805 supply of oil *(WHILE IN A SMALL STREAM
Per F TO DISTILL) ~~to vaporize~~ the same while under
pressure, in continuously discharging vapors produced,
and in causing the vapors to pass through a plurality
of separated bodies of petroleum oil maintained at
such a temperature as to condense heavier fractions
of the vapors without condensing the lighter oil fractions
or gasoline like hydrocarbons, and in collecting and
condensing the lighter fractions which escape condensation
in said liquid bodies.

Insert F12

The foregoing claims are drawn to cover the applicant's process of vaporizing the oil under pressure, and then

---

* Matter in parentheses inserted.

causing these vapors to pass through a series of pools or separated bodies of oil where the vapors are scrubbed and the heavier fractions condensed, while the lighter fractions which escape condensation pass on out for final condensation and collection.

The applicant, as pointed out in the original specification, appreciates the desirability of filtering the vapors and also condensing the heavier fractions by passing them through the successive oil bodies which are all heated and of different temperatures. The oil bodies are always at such temperatures as will cause a condensation of the heavy fractions without condensing the lighter gasoline like vapors, and these desirable vapors are then discharged for final condensation producing gasoline. It is thought that prior to the applicant's filing date there is no art which discloses this, and it is believed that the Examiner will pass the claims to immediate allowance.

Respectfully submitted,
Carbon P. Dubbs,
By Frank L. Belknap,
Attorney.
37

Jan. 14, 1922.

2806 2—260

Div. 31 Room 169	Paper No. 13
Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.	All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

CSD/AMT

DEPARTMENT OF THE INTERIOR
United States Patent Office
Washington

(Stamp) Patent Office Mar 7 1922 Mailed.
Frank L. Belknap
1st Nat. Bank Bldg.
Chicago, Ill.

Please find below a communication from the Examiner in charge of the renewal application of Carbon P. Dubbs,

filed Dec. 14, 1921, serial No. 522,397, for Method and Apparatus for Treating Petroleum, etc.

Thomas E. Robertson,

Amendments of December 14, a 1921 and January 17, 1922 are of record.

Page 3, line 5, insert —heat— before "interchangers".

Page 4, line 8, change "in the furnace B-2" to —in the heating coil B^2—.

Attention is called to fifth paragraph of office letter of March 5, 1919, in which was pointed out the confusion resulting from indiscriminate use of "retort" and "still" to designate containers A', A^2, etc. This confusion still exists since claims 3 and 4 read on "stills" while the remaining claims are drawn to "retorts". As previously pointed out, it is thought that "still" is more appropriate than "retort". At any rate it is made a requirement that uniformity of terminology be maintained.

Page 2, line 7, 9; page 3, lines 7, 24, 31; page 4, lines 9, 10, 11, 18, 24, 26; page 6 lines 12, 22; and in amendments inserted after line 31 page 4; at the end of the specification and after "gauges" in line 7, page 3, change "retort" (2) to —still—(2). The claims should also be amended in this respect.

In line 2 of claims 1, 2, 3 and 4, "lighter" should be —lower—.

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2807

Lines 9 to 11 of claim 3 are not quite clear to the examiner now in charge of the case. What is the antecedent of "it" in line 11? Is it meant that through the current set up by the injection of vapors into the lower part of a still oil is caused to circulate therefrom into the succeeding heating zone? If so, no disclosure has been found on which to base this step. Either an explanation or amendment is respectfully requested.

Line 2 of claims 7 to 9, change "from" to —by—.

Claim 5 is rejected as indefinite as to the directiton of travel of the vapors. Applicant discloses a process in which vapors are led from a still back through a preceding still or stills, and he is not entitled to a claim broader than this disclosure.

Claims 6, 7 and 9 do not positively identify the "vapor receiving retort" with the "early stage retort" and there-

fore are also indefinite as to the direction of travel of the vapors. They are rejected as indefinite and broader than the disclosure.

Claims 1 to 9 appear allowable in substance, but formal allowance is withheld pending compliance with the requirements for amendment made in this letter.

Claims 10 to 14, added by amendment of January 17, 1922, have been considered and are all rejected as failing to distinguish from applicant's patent 1,231,509. These claims do not recite the passage of oil in a relatively small stream through a furnace, neither do they recite the fact that the vapors are passed to a preceding still or stills. Claim 10 is further rejected as unwarranted in view of the purifying step.

In amending claims, applicant is urged (1) to preserve uniformity of terminology and use still in preference to "retort"; and (2) to bring out the fact that vapors are delivered to a preceding still or stills.

C.S.D.

W. W. Holmes,
Examiner.
R39

2808 IN THE UNITED STATES PATENT OFFICE.

(Stamp) Application Room U. S. Patent Office Jun 3 1922.

Paper No. 14
Jun 5 1922
Division 31. F

Re Renewal Application
Carbon P. Dubbs,
Method and Apparatus for
Treating Petroleum, etc.,
Filed Dec. 14, 1921,
Serial No. 522,397.

Hon. Commissioner of Patents,
Sir:

In the matter of the above entitled application, and responding to the official action of Mar. 7, 1922, amendment is hereby made as follows:

Page 3, line 5, insert —heat— before "interchanges".

Page 4, line 8, change "in the furnace B" to —in the heating coil B^2.—

The Examin r's suggestion with regard to the use of the term "still" has been noted, and the applicant has no objection to using still throughout the specification in lieu of retort.

Page 2, lines 7 and 9, page 3, lines 7, 24 and 31, page 4, lines 9, 10, 11, 18, 24 and 26, page 6, lines 12 and 22, and in the amendments inserted after line 31, page 4, at the end of the specification, and after "gauges" in line 7, page 3, change "retort" to —still—.

In line 2 of claims 1, 2, 3 and 4, change "lighter" to —lower—.

Claim 3, line 9, after "still" cancel "by" and insert —, in—. Same claim, line 11, cancel "it" and insert —said vapors—.

Claim 5, lines 4 and 5, change "retorts" to —stills—. Same claim, lines 6 and 7, cancel "first to the last stage

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2809 F[1] retort" and insert —from the first to the last of said serially connected stills—. Same claim, line 7, cancel "retorts" and insert —~~to the~~ stills—. Same claim, line 8, cancel "retorts to one of the

F[2] retorts" and insert —stills to one of the stills in the series which constitutes a vapor receiving and discharge still—. Same claim, line 9, cancel "said vapor receiving retort" and insert —vapor receiving and discharging still—. Same claim, line 13, change "retort" to —stills—.

Claim 6, line 5, cancel "retorts" and insert

F[3] —stills including an initial intermediate and a last stage still—. Same claim, line 6, cancel "first to the last stage retort" and insert —initial to the last stage still—. Same claim, line 7, change "retorts" to —stills—, both occurrences, and before

F[4] "in" last occurrence insert —which constitutes a vapor receiving and discharging still—. Same claim, line 8, after "receiving" cancel "retort" and insert —and discharge still—. Same claim, line 12, cancel "an early stage" and insert —one of said stills—. Same claim line 13, change "retorts" to —stills—.

Claims 7 and 9, line 2, change "from" to —by—. (CLAIM 7) ~~Same claim,~~ line 6, change "retorts" to —stills—. Same claim, line 7, cancel "stage retort" and insert —still—. Same claim, line 8, change "retorts" to —stills— both occurrences.

Same claim, line 9, change "retorts" to —stills— and after "receiving" cancel "retort" and insert —and discharge still—. Same claim, line 10, cancel "retort" and insert —and discharge still—. Same claim, lines 13 and 14, cancel "an early stage retort" and insert —one of said stills—. Same claim, line 14, change "retorts" to —stills—.

Claim 8, lines 4, 6, 9 and 10, change "retorts" to —stills—. Lines 6 and 11, change "retort" to —still—.

Claim 9, line 5, change "retort" to —still—. Same claim, line 7, change "retorts" to —still—.

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2810 Same claim, line 8, cancel "said retort" and insert —of said still—. Same claim, lines 9 and 10, change "retorts" to —stills—. Same claim, line 11, cancel "retort" and insert —and discharge still—. Same claim, line 12, cancel "retort" and insert —and discharge still—. Same claim, line 14, change "retorts" to —stills—.

Claim 10, line 3, after "pressure" insert —by heating the same when in a small stream—. Same

F5 claim, line 5, after "temperatures" insert —travelling in a direction opposite to the travel of said vapors—.

Claim 11, line 3, after "pressure" insert —by

F6 heating the oil while in a relatively small stream—. Same claim, line 8, after "other" insert —and

F7 travelling in a direction opposite to the travel of the vapors—.

Claim 12, line 3 after "pressure" insert —by

F8 heating the oil while travelling in a small stream—. Same claim, line 8, after "other" insert —and

F9 travelling in a direction opposite to the travel of the discharging vapors—.

Claims 10, 11 and 12, line 2, change "vaporizing" to —distilling—.

Claim 13, line 2, change "vaporizing" to —distilling—. Same claim, line 3, cancel "by heat and

F10 pressure" and insert —by passing the oil while

under pressure in a small stream through a zone of heat—. Same claim, line 5, after "temperatures" insert —said pools discharging from one to the other while the vapors travel through the pools of oil in an opposite direction—.

F11

Claim 14, line 3, cancel "to vaporize" and insert —while in a small stream to distill—.

Add the following claims:

42

2811 15. The process of cracking petroleum oil, comprising passing the oil continuously in a small stream through a furnace where the oil is heated to a cracking temperature, in then

F12 passing the heated oil through a series of separate serially connected stills, in heating the oil during its passage from the first to the last of said stills, in passing ~~oily constituents~~ ^G1 ~~that leave one still~~ Sub G1 ~~as a vapor to~~ another of said connected stills, in discharging vapors fome one of said stills to ^G1½ a dephlegmator Inst G1½ *(AND), in returning oil constituents from the dephlegmator to one of the stills for repassage through *(SAID) ~~succeeding~~ stills to undergo reheating, Per G and in maintaining the oil undergoing distillation under a substantial vapor pressure.

16. The process of cracking petroleum oil, which comprises passing the oil in a small stream through a furnace, in then passing the same through a series of serially connected stills, in heating the oil while travelling from the first to the last of said stills, in providing in each still a vapor receiving space, in passing oily constituents that accumulate in the vapor receiving space of

* Matter in parentheses inserted.

certain of the stills as a vapor to one of said stills that constitutes
a vapor receiving and discharge still, in discharging vapors from said
vapor receiving and discharge still to a dephlegmator, in passing
uncondensed vapors from the dephlegmator to a condenser for condensation
and collection, in returing oil constituents from said dephlegmator to
one of the stills to pass through the serially connected stills for
reheating, and in maintaining the oil undergoing distillation under a
substantial vapor pressure.

17. The process of cracking petroleum oil,
Per H which comprises passing oil continuously through a small stream *(IN) ~~to~~
a furnace to heat the same to a cracking temperature, in passing the heated
oil successively through a series of serially connected stills, in
applying heat to the oil while passing from the first to the last of said

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2812 stills, in passing vapors generated in certain of the stills through
preceding stills in a direction opposite to the flow of the oil, in
discharging vapors from one of said stills to a dephlegmator, in passing
uncondensed vapors from a dephlegmator to a condenser, in returning
oil constituents from the dephlegmator to one of said stills for passage
through subsequent stills, and in maintaining the oil under a vapor
pressure during distillation.

18. A process of cracking petroleum oil,
which comprises the oil in a relatively small stream through a
furnace to be heated to a cracking temperature, and in then passing

* Matter in parentheses inserted.

Per G | the heated oil *(IN A LIQUID PHASE) successively through a plurality of independent serially
connected stills, in applying heat to the oil while passing from the
Per G | first to the last of said stills, in passing oily constituents generated *(FROM THE LIQUID OIL UNDERGOING TREATMENT)
in certain of said stills in the form of vapors through other connected
stills, in discharging the vapors from one of said stills into a
dephlegmator, in passing uncondensed vapors from the dephlegmator to
a condenser for condensation and collection, in returning oil constituents
from the dephlegmator to one of the retorts for retreatment and in
maintaining the oil while undergoing distillation under a substantial
vapor pressure.

19. The process of cracking petroleum oil, comprising passing the oil in a relatively small stream through a furnace,
in passing the heated oil through a plurality of separate serially
Per G | connected *(STILLS) ~~retorts~~ to pass successively through said *(STILLS) ~~retorts~~, and to be
" " | heated while passing from the first to the last *(STILL) ~~retort~~, in *(TRANSFERRING) ~~discharging~~
" " | vapors generated in certain of said stills ~~in~~to communicating stills,
Per G | in discharging ~~the~~ vapors from *(ONE) ~~certain~~ of ~~the~~ *(SAID) ~~stills~~ into a dephlegmator,
per G | in passing uncondensed vapors from the dephlegmator to a condenser for
condensation and collection, in returning oil constituents from the
Per G | dephlegmator *(FOR PASSAGE THROUGH SAID) ~~to the~~ stills ~~for retreatment~~ and in maintaining the oil under

* Matter in parentheses inserted.

2813 a vapor pressure during distillation.

20. The process of cracking petroleum oil, comprising passing the oil in a relatively small stream through a furnace, in passing the heated oil through a plurality of separate

Per G serially connected *(STILLS) ~~retorts~~ to pass successively through said

Per G *(STILLS) ~~retorts~~

Per H and to be heated while passing *(THROUGH SAID) ~~from the first to the last~~ *(STILLS) ~~retorts~~, in discharging vapors generated in certain of said stills into

Per H communicating stills passing *(SAID VAPOR) in a direction opposite to the path of travel of the oil, in discharging vapors from certain of the stills into a dephlegmator, in passing uncondensed vapors from the dephlegmator to a condenser for condensation and collection, in returning the oil constituents from the dephlegmator to the stills for retreatment and in maintaining the oil under a vapor pressure during distillation.

21. The process of cracking petroleum oil, which comprises preliminarily heating the oil by heat extracted in cooling the heated vapors and gases by said oil, in then passing the

Per G oil in a small stream *(THROUGH) ~~to~~ a furnace to be heated to a cracking temperature, in discharging the heated oil into a still to pass therethrough and through successive communicating stills, in heating the oil while travelling from the first to the last of said stills, in passing vapors generated in certain stills through other stills into a still in the series which constitutes a vapor receiving and discharging still, in discharging vapors from said vapor receiving and discharge still to

* Matter in parentheses inserted.

a reflux condenser, in returning oil constituents from the condenser to
one of the stills for passage therethrough and through other stills,
and in maintaining the oil under a vapor pressure during distillation.

22. The process of cracking petroleum oil, which comprises preliminarily heating the oil by heat extracted in
cooling the heated vapors and gases by said oil, in then passing the oil
in a small stream to a furnace to be heated to a cracking temperature,

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2814 in discharging the heated oil into a still to pass therethrough and
through successive communicating stills, in heating the oil while travelling
from the first to the last of said stills; in passing vapors generated
in certain stills through other stills into a still in the series which
constitutes a vapor receiving and discharging still, said vapors passing
in a direction opposite to the direction of the flow of the oil, in
discharging vapors from said vapor receiving and discharge still to a
reflux condenser, in returning oil constituents from the condenser to one
of the stills for passage therethrough and through other stills, and in
maintaining the oil under a vapor pressure during distillation.

23. The process of treating petroleum oils, to convert heavy into lighter boiling point hydrocarbons, comprising passing
the oil in a small stream through a heating coil, in then passing the oil
through a series of serially connected stills, in heating the oil while
passing from the first to the last of said stills, the overflow oil from

* Matter in parentheses inserted.

each still being caused to pass to a succeeding still, in passing vapors
generated in one still back to a succeeding still to pass therethrough in
a direction opposite to the travel of the oil, in discharging vapors
for reflux condensation, and in returning oily constituents resulting from
reflux condensation for retreatment in said stills.

24. A process of treating petroleum oil to convert into lighter boiling point hydrocarbons, which consists
in passing the oil in a small stream through a heating zone, in then
passing the oil successively through a series of stills, in heating
Per H the oil while passing *(FROM THE FIRST TO THE LAST OF) ~~through~~ said stills, in discharging vapors from
certain of the stills, and in passing said vapors through preceding
Per H stills ~~travelling~~ in a direction opposite to the flow of oil passing
from one still to the other, in subjecting the vapors to a reflux condensation,

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2815 and in returning to ~~one of~~ said stills *(REFLUX
Per H CONDENSATE) ~~oil constituents~~ for
passage therethrough for retreatment.

Per H 25. The process of treating petroleum oil to convert heavy into lighter boiling point hydrocarbons, which comprise*(S)
passing the oil in a small stream through a furnace, in then passing the
oil through a series of connected stills wherein the oil progressively
travels through one still to the other, in applying heat to the oil
Per H while passing *(FROM THE FIRST TO THE LAST OF) ~~through~~ said stills, in taking off vapors from one still
and passing them back to a preceding still, in discharging the vapors

* Matter in parentheses inserted.

for reflux condensation, and in returning reflux condensate to one of
said stills to pass through the series of stills for retreatment.

26. The process of treating petroleum oil
Per H to convert heavy into lighter boiling point hydrocarbons, which comprise*(S)
passing the oil in a small stream through a furnace, in then passing
the oil through a series of connected stills wherein the oil progressively travels through one still to the other, in applying heat to
Per H the oil while passing *(FROM THE FIRST TO THE LAST OF) ~~through~~ said stills, in taking off vapors from
one still and passing them back to the preceding still wherein said
Per H vapors perc*(O)olate through the body of oil contained therein, in discharging
the vapors for reflux condensation, and in returning the reflux condensate
to one of said stills to pass through the series of stills for retreatment.

Insert G²

The applicant has most carefully amended all of the original claims in accordance with the Examiner's suggestions, wherein it was stated that claims 1 to 9 were allowable in substance, and it is thought that these claims as well as claims 10 to 14 and the new claims are in condition for allowance.

While it is true that in a number of the claims the applicant has not specifically pointed out that the vapors travel through the connected retorts counter current to the pas-

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2816 sage of the oil, it is not thought that this specific limitation should be insisted upon in regard to each claim. He has in some claims pointed out that the vapors travel in this course, while in other claims, which is strictly permissible, he has referred to the vapors as passing through other retorts and has not defined said retorts as consisting of preceding retort. Manifestly, this manner of passing the vapors would be a mere reversal of the direction of travel of the vapors, and certainly under the patent laws he

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* Matter in parentheses inserted.

should not be required to limit all of the claims in this manner so that said claims could be easily avoided or else in the case of a suit the applicant would have to insist upon the doctrine of reversal in order to prevent a competitor from securing his same ends by the same process in which the competitor merely passes the vapors in the direction of the flow of the oil rather than opposite to the flow of the oil. The fundamental idea is that the oil should first be heated to a cracking temperature in a small stream, then delivered through a series of succeeding retorts or stills and heated while passing through these retorts, the vapors generated in one retort being, however, caused to pass through other retorts to be further heated and to be purified and after this passage the said vapors are then discharged for reflux condensation with the reflux constituents returned to the retorts. It is obvious that the Examiner should not insist that the applicant specifically point out that the vapors pass counter current to the oil for the real inventive thought in this process can be carried out whether they travel with or opposite to the path of the oil and as every claim is strictly readable in terms on this disclosure without any attempt to stretch language, an early allowance is respectfully asked.

Respectfully submitted,
Carbon P. Dubbs,
By Frank L. Belknap,
Attorney.

May 31, 1922. 48

2817 IN THE UNITED STATES PATENT OFFICE.

Paper No. ....

(Stamps) Application Room Jun 28 1922 U. S. Patent Office.
Div. 31, Room 169,
Carbon P. Dubbs,
Method and Apparatus for Treating Petroleum or Other Hydrocarbons,
Filed Jan. 27, 1917,
Serial No. 144,979,
Allowed March 18, 1920.

SUPPLEMENTAL AMENDMENT.

Hon. Commissioner of Patents,
Sir:

In the matter of the above entitled application, it is respectfully requested that the following amendments be

entered to the claims submitted in the amendment last filed in this application:

G¹ Claim 15, lines 6 and 7, cancel "oily constituents that leave one still as a vapor to" and insert

G¹½ liquid oil and vapors from one still in the series to and through; same claim, line 8, after "stills" insert constituting a vapor receiving and discharging still; same claim, same line, after "dephlegmator" insert and; same claim, line 10, change "succeeding" to said.

Claim 18, line 4, after "oil" insert in a liquid phase; same claim, line 6, after "generated" insert from the liquid oil undergoing treatment.

Claim 19, line 4, change "retorts" to still, both occurrences. Same claim, line 5, change "retort" to still. Same line, change "discharging" to transferring. Same claim, 49

2818 line 6, change "into" to to. Same claim, line 7, cancel "the" before "vapors". Same claim, same line, cancel "from certain of the stills" and insert from one of said stills. Same claim, line 10, cancel "to the stills for retreatment" and insert for repassage through said stills.

Claim 20, line 4, change "retorts" to stills, both occurrences. Same claim, line 5, change "retort" to still.

Claim 21, line 4, change "to" to through.

Add the following claim:

G² 27. The process of cracking petroleum oil, which comprises passing the oil in a small stream through a heating coil to be subjected to a cracking temperature while maintained under a vapor pressure, in then passing the heated oil through a plurality of communicating stills wherein the oil accumulates in a pool in each still, in heating the oil during its passage from the first to the last still, in passing vapors generated from the oil through com-

municating stills into one of said stills, constituting a
vapor receiving still, in discharging vapors from said still
to be subjected to their initial reflux treatment, and in
returning reflux condensate for repassage through said stills.

It is believed that the Examiner will pass this application to immediate allowance.

Respectfully submitted,
Frank L. Belknap.

June 22, 1922.

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2819 2—260

Div. 31 Room 169 CSD/AMT Paper No. 16

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

(Stamp) Patent Office Aug 9 1922 Mailed.

DEPARTMENT OF THE INTERIOR

United States Patent Office

Washington

Frank L. Belknap
1st Nat. Bank Bldg.
Chicago, Ill.

Please find below a communication from the Examiner in charge of the renewal application of Carbon P. Dubbs, filed Dec. 14, 1921, serial #522397 for Method and Apparatus for Treating Petroleum, etc.

Thomas E. Robertson,
Commissioner of Patents.

Amendments of June 3 and June 28, 1922 are of record.

Claims 1, 2, 22 and 23 are allowed.

Claim 4, line 13, after "pipes" insert —for vapors leading from the top of one still to—; same line, before "stills" insert —next preceding—; same line, singularize "stills"; line 11, change "zone" to —units—.

Claim 17, line 2, change "to" to —in—.

Claim 20, line 7, before "passing" insert —said vapor—.

Claim 24, line 5, cancel "through" and substitute —from the first to the last of—; line 7, cancel "travelling"; line 9, cancel "one of"; same line, change "oil constituents" to —reflux condensate—.

Claim 25, line 2, change "comprise" to —comprises—; line 6, change "through" to —from the first to the last of—.

Claim 26, make the same corrections as required for claim 25, and in addition correct "percolate," line 8.

If amended as corrected claims 4, 17, 20, 24, 25 and 26 may be allowed.

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2820 Claims 3, 5, 6, 7, 8, 9, 14, 15, 16, 18, 19, 21 and 27 are rejected for the reasons and on references of record. They fail to point out the direction of travel of the vapors and are therefore broader than the disclosure.

The following references are made of record:

Hopkins 1,199,463 Sept. 26, 1916 — 196-31
Perrier 544,516 Aug. 13, 1895 — 196-7.

Testelin of record, shows the passage of oil through a coil in a furnace heated to a cracking temperature. Von Groeling of record shows the passage of vapors through a plurality of pools of oil, the vapors and oil passing in opposite directions. Hopkins cited shows the passage of vapors in contact with a supply of charging oil passing down the run-back 9 and the contact of vapors with a body of oil in chamber 21.

Perrier, in fig. 2, shows the passage of vapors through bodies of oil passing in an opposite direction. Note lines 33-38, 90-125, page 2 of Perrier. Claims 10, 11, 12 and 13 are rejected on Testelin taken in conjunction with Hopkins, Von Groeling or Perrier.

W. N. Holmes,
Examiner.

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2821 IN THE UNITED STATES PATENT OFFICE.

Paper No. 17

(Stamp) Application Div. Nov 7 1922 U. S. Patent Office.

Carbon P. Dubbs,
Method and Apparatus for Treating
Petroleum and Other Hydrocarbons,
Filed Dec. 14, 1921,
Serial No. 522397,
Renewal of Ser. No. 144979.

Hon. Commissioner of Patents,

Sir:

In the matter of the above entitled application, amendment is hereby made as follows:

Claim 4, line 13, after "pipes" insert —for leading vapors from the top of one still to—. Same line before "stills" insert —next preceding—. Same line, singularize "stills". Line 11, change "zone" to —units—.

Claim 17, line 20, *(2) change "to" to —in—.

Claim 20, line 5, cancel "from the first to the last report" and insert —through said retorts—. Same claim, line 7, after "passing" insert —said vapor—.

Claim 24, line 5, cancel "through" and insert —from the first to the last of—. Line 7, cancel "travelling". Line 9, cancel "one of"; same line, change "oil constituents" to —reflux condensate—.

Claim 25, line 2, change "comprise" to —comprises—. Line 6, change "through" to —from the first to the last of—.

Claim 26, line 2, change "comprise" to —comprises—. Line 6, change "through" to —from the first to the last of—. Same claim, line 8, correct the spelling of "percolate".

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2822 The rejection of claims 3, 5, 6, 7, 8, 9, 14, 15, 16, 18, 19, 21 and 27 as being broader than the disclosure is not well taken, and should be waived.

It is true that these claims do not define the vapors as travelling in a direction opposite to the travel of the oil,

but it is earnestly submitted that it is not necessary to so limit all the claims, and that the prior art does not require such a limitation. An applicant is always permitted to claim his invention generiely if the state of the art so warrants, and to also claim the invention specifically. This is what he has attempted to do in this application by including one set of claims without the positive limitation of passing the vapors in a counter direction to the travel of the oil, while in the other set of claims this limitation is present. The limitation is not a patentable one alone, and the last group of claims do not need such a limitation to warrant the allowance thereof. If the Examiner will review this specification he will find that the essential idea of this applicant was to pass a body of oil through a plurality of communicating stills and to cause the vapors generated thereby to likewise pass through different stills for the purpose of heating said vapors, and for the purpose of purifying them by contact with the liquid oil bodies in the different stills. As pointed out in the last line of page 1 of the specification, the applicants state that the vapors and gases were preferably allowed to percolate up through different stills from a still having a higher temperature to a still having a lower temperature. Such a passage of the vapors through the different oil bodies was the broad conception of this applicant because he appreciated that this contact of the vapors with the oil served to purify them,

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2823 served to reduce the amount of uncondensable gases and unsaturated hydrocarbons, and he was enabled to give the vapors their proper heat treatment. As a disclosure, he illustrated the vapors as travelling counter current to the travel of the oil. This was only one illustration of his invention, and manifestly, this applicant should not be specifically limited in each claim by such a direct limitation which would enable any infringer to merely pass the vapors in the same direction as the oil through the successive retorts and cut down the temperature in each retort if he so desired so that the vapors were subjected to decreasing temperatures, although they travel in the direction of the oil. Certainly, this would be only a colorable distinction from the applicant's invention, and his invention is not so limited so as to fail to include a process of this character. The results would be substantially the same, and they would be obtained in substantially the same

manner. There is no question but that the claims in language are readable on the disclosure, and the claims are not broader than the invention merely because they do not specifically point out that the vapors travel in a direction opposite to the travel of the oil. They are limited to the extent that the vapors pass through the various stills in communication with one another, and it is this result, if coupled with the heating of the oil in the fine streams which constitutes the novel and patentable ideas embodied in this application. Had the direction of the travel of the vapors been essential to the operation of the process or had the inclusion of this limitation in the claims been necessary by reason of the prior art a different state of facts would have existed. It is submitted, however, that no such limitation

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2824 is needed, and it is earnestly believed that the Examiner will appreciate that the inventive thought is the same whether the vapors travel with the oil or counter current thereto. In either event they contact with the oil, they are scrubbed and cleaned by the oil, and they are given the rather long period of treatment while in contact with liquid oil for the purpose of reducing incondensable gases and unsaturates. The applicant could have shown as another embodiment of this invention a disclosure where the vapors travel from one retort to another with the oil and where the temperatures in the successive retorts were either reduced or increased and he appreciates now, as he did when this disclosure was made, that such a practice would be the mere equivalent of a process he has shown, the apparatus for carrying out said process merely being one illustration of a successful apparatus.

As to claims 10, 11, 12 and 13, it is submitted that the prior art is not pertinent, and a reconsideration of these claims is asked. Perrier does not show a cracking still, Von Groeling fails to illustrate the plurality of connected stills, and obviously Hopkins who merely shows a reflux condenser has no application to these claims. Testalin is not pertinent because he does not show the arrangement of the successive retorts to receive the bulk supplies of oil, and such a combination of references, as pointed out in the last paragraph is not legitimate, and would never be sustained. It is sufficient to say that Von Groeling does not show the communicating stills. It merely illustrates a preheating pipe or coil leading to a single still. The specification refers to the fact that the oil in the coil is

warmed, and obviously any cracking that occurs, occurs in the still alone. To be the equivalent of the applicants,

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2825 Von Groeling would have to have disclosed a plurality of the stills in communication with one another, which disclosure he did not make.

The Examiner's attention is called to the fact that claim 1 as originally filed was not limited in any respect to the passage of the vapors in a direction counter current to the flow of oil. It merely referred broadly to the discharge of the vapors from any given retort, and clearly shows that the applicant believed his invention at that time to be just as broad as he now believes it to be, and under the practice he is undoubtedly entitled to the claims he is now seeking, which are readable in terms on his disclosure and which are similar in scope to his original claims. It would be unjust to compel him to limit all of his claims to the reverse flow of the vapors, as the desirable results attained by this process are not entirely dependent upon this travel of the vapors. So long as the vapors keep in the retorts, are heated therein, or contact with the oil in any way, or in fact travel along with the oil, the most desirable results of this process can be attained, and if the applicant were compelled to limit his claims, any competitors could use substantially his same general invention and avoid infringement.

It is thought that this application is now in condition for immediate allowance.

Respectfully submitted,

Carbon P. Dubbs,
By Frank L. Belknap,
Attorney.

Nov. 6, 1922.
CMT.

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2826 Div. 31 Room 169

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

Paper No. 18

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

CSD/AMT

DEPARTMENT OF THE INTERIOR

United States Patent Office

Washington

(Stamp) Patent Office Feb 16 1923 Mailed.

Frank L. Belknap,
1014 1st Nat. Bank Bldg.
Chicago, Ill.

Please find below a communication from the Examiner in charge of the renewal application of Carbon P. Dubbs, filed Dec. 14, 1921, serial #522,397, for Method and Apparatus for Treating Petroleum and other Hydrocarbons.

Thomas E. Robertson,
Commissioner of Patents.

Amendment of Nov. 7, 1922 is of record.

It is not clear what line of division applicant intends to maintain between this case and his co-pending case serial No. 252,301. Certain claims of the latter case could apparently be made in this application, and it is respectfully pointed out that whichever application issues first will serve as a reference against the other, for all common subject-matter.

The following additional art is cited:

Clark, 1,119,496, Dec. 1, 1914 196-31.

Claims 1 and 2 stand allowed.

Claim 4 is allowed.

Claims 3, 5, 6, 7, 8, 9, 14, 15, 16, 18, 19, 21 and 27 are again rejected for the reasons and on the references of record. They fail to point out the direction of travel of the vapors and are therefore broader than the disclosure.

Upon reconsideration of claims 22 and 23, formerly con-

sidered allowable, and claims 17, 20, 24, 25 and 26, it is now believed that the step of heating the oil as it passes through the plurality of stills is so broadly recited in these claims

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2827 as not to properly differentiate over Dubbs 1,231,509 in view of either Clark cited or Edwards of record. It is pointed out that these claims merely recite "passing the oil in a small stream through a heating coil (or furnace), in then passing the oil through a series of serially connected stills, in heating the oil while passing from the first to the last of said stills". It is pointed out that in Dubbs 1,231,509 the oil is heated progressively by means of internal steam coils as it passes through the series of stills and the broad step of "heating the oil while passing from the first to the last of said stills" in these claims does not differentiate from the heating step of the Dubbs patent. These claims are so broad in terms as to permit applicant to heat oil in a single coil and then pass it into the series of stills of the Dubbs patent. The step of passing oil through a coil or heater in a furnace and then to a still or vapor chamber outside the furnace is old as shown by either Clark or Edwards. Although these claims recite the counter-flow of vapors and oil it is pointed out that this is disclosed in Dubbs 1,231,509.

Claims 22, 23, 17, 20, 24, 25 and 26 are therefore rejected on the ground that to heat oil in the coil or heater of either Clark or Edwards and then pass it into the series of stills of Dubbs would not involve invention.

Claims 5, 6, 7, 8, 9, 14, 15, 16, 18, 19, 21 and 27 are further rejected on Dubbs in view of either Clark or Edwards for the reasons given for claims 22, 23, 17, 20, 24, 25 and 26.

Claims 10, 11, 12 and 13 are rejected on the ground that there would be no invention in heating a stream of oil in the coil or heater of either Clark or Edwards and passing it to the series of stills of Dubbs, 1,231,509.

W. W. Holmes,
Examiner.

C.S.D.

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2828 Paper No. 19.

IN THE UNITED STATES PATENT OFFICE.

Div. 31, Room 169,
Carbon P. Dubbs,
Method and Apparatus for Treating
Petroleum and Other Hydrocarbons,
Filed Dec. 14, 1921,
Serial No. 522,397.
Hon. Commissioner of Patents,
Sir:

In the matter of the above entitled application, and responding to the official action of February 16, 1924, amendment is hereby made as follows:

The rejection of claims 3, 5, 6, 7, 8, 9, 14, 15, 16, 18, 19, 20 and 27 is not well taken. This applicant is certainly not required in view of the present state of the art to recite in these claims that the vapors specifically pass counter-current to the travel of the oil. In fact, if the Examiner will look over the recently issued patent to Dubbs covering the apparatus of which patent No. 1231509 covers the process, he will find that practically all of the claims merely recite that the vapors pass from one still to another and are discharged from one of said stills to a condenser. There is not the slightest suggestion in these claims that the vapors must travel in a direction the reverse of the direction of travel of the liquid oil. The Office clearly recognized during the prosecution of the application resulting in this patent that such a limitation was not necessary. The identical question is here involved and as the Office has already admitted in the granting of one patent the right of this applicant to draw claims in this manner it should not in this application attempt to hold to the contrary. It is a well settled practice that claims can be

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2829 drawn as broadly as the prior art will permit, and this invention among other things aims to pass vapors through a series of shells or expansion chambers and discharge said vapors from one or more of said chambers to a reflux condenser. It is immaterial whether these vapors pass counter-current to the oil flow or not. The prior art does not demand that such a limitation be placed in the claims, as they are allowable as now drawn

because they include the cracking coil and the successive chambers through which the oil passes with means for heating the oil during its travel through said chamber.

The prior art cited by the Examiner has been carefully considered, but it is respectfully submitted that the claims are not anticipated.

Claims 17, 20, 22, 23, 24, 25 and 26 are not shown by the Dubbs patent and they are not anticipated by Clark and Edwards. These claims define a process. Essentially, the process as defined in the claims resides in the steps of passing the oil in a relatively small stream through a furnace, and in then passing the oil through a plurality of serially connected retorts where the oil is heated during its passage from the first to the last retort and during said passage the vapors are also passed along with the oil and are finally subjected to a reflux condensation, the reflux being returned for passage through the apertures. Dubbs 1231509 is a patent issued to this inventor. In this Dubbs patent the oil is heated in a bulk still. Thus, we have the idea of applying the heat to a zone where the vaporization occurs and where large quantities of carbon form so that in a short time the heat produced from the carbon might hurt the still walls when certain characters of oils are being distilled and where certain high temperatures and pressures are connected. The claims all call for the heating of the oil in the stream and the delivery of the liquid oil to a chamber where the vaporization occurs and where the carbon is formed.

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2830 Clark and Edwards are not anticipations because they merely show a process where the oil is heated in a tube and reacts in a tank. They do not suggest the provision of successive tanks where the oil accumulates in pools and the idea of heating the oil while passing from one of said tanks to another. Therefore, it is clear that neither Clark nor Edwards disclose the process herein claimed. They only disclose the heating of the oil in a coil. The successive arrangement of the retorts is not shown in these patents, nor is there any suggestion in them of the thought of using such a process. As a process can be only anticipated by a like process, it is clear that these patents are not anticipations under the doctrine as laid down by the Supreme Court in *Carnegie* v. *Cambria Iron Co.*, 99 O. G. 1866.

Claims 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 18, 19, 21 and 27 all clearly distinguish from the references to Dubbs and Clark because neither the Dubbs patent alone which is a prior patent of this applicant's discloses the process set forth in these claims, nor does the patent to Edwards or Clark show such a process. The Examiner should not attempt to combine these patents in the manner set forth in this office letter. Dubbs conceived of this invention and recognized that it constituted an improvement over his earlier patent 1321509 and it is for this reason that the present application was filed. Certainly, this applicant would not have filed an application had he believed that the invention was the same as disclosed in his early patent. He realized the desirability of heating the oil in a stream in a process of this particular kind, that is to say, a process embodying the successive reacting zones through which the oil must pass, and certainly such a process is not anticipated by his own patent and it is not legitimate to say that his own patent can be completely reorganized or changed in the light of the patents to Clark or Edwards so as to perform his process. We believe that no process

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2831 where it obviously has merit is anticipated by a like process and neither one of the patents referred to disclose the same process now claimed.

It is respectfully asked that the Examiner should allow this application.

Respectfully submitted,

Carbon P. Dubbs,

By Frank L. Belknap,

Attorney.

Feb. 16, 1924.

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2832 Div 2 Room 169 Paper No. 20

Address only "The Commissioner of Patents, Washington, D. C.," and not any official by name.

All communications respecting this application should give the serial number, date of filing, title of invention, and name of the applicant.

CSD-AMT DEPARTMENT OF THE INTERIOR

United States Patent Office

Washington

(Stamp) Patent Office Mar 15 1924 Mailed.

Frank L. Belknap
1st Nat. Bank Bldg.
Chicago, Ills.

Please find below a communication from the Examiner in charge of the application of Carbon P. Dubbs, filed Dec. 14, 1921, serial #522397, Method and Apparatus for Treating Petroleum and other Hydrocarbons.

Thomas E. Robertson,
Commissioner of Patents.

Letter filed Feb. 16, 1924 is of record.

Claims 1, 2 and 4 stand allowed.

Claim 3 is allowed.

Claims 5 to 27 inclusive are finally rejected on the references and for the reasons of record.

It is noted that in line 5 of allowed claim 3, "alternatively" should be —alternately—.

W. N. Holmes,
Examiner.

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2833 Paper No. 21.

IN THE UNITED STATES PATENT OFFICE

Doherty
vs.
Dubbs } Interference No. 55,846.

(Stamp) Attorney's Room May 10 1930 U. S. Patent Office.

REQUEST FOR INSPECTION AND TO MAKE COPIES.

Commissioner of Patents
Washington, D. C.

Sir:

In accordance with the Notice filed by the party Dubbs in the above entitled interference Dubbs' abandoned application Ser. No. 522,397 filed December 14, 1921 as a renewal of Dubbs' application Ser. No. 144,979 filed January 27th, 1917, is relied upon by the party Dubbs in accordance with the provisions of Rule 154, paragraph E.

The party Doherty therefore hereby requests that Stone, Boyden, Mack and Hahn of Washington, D. C., be permitted to have access to the above indicated abandoned application for the purpose of inspecting the papers and making copies thereof.

Respectfully submitted,

Edmund G. Borden,
Attorney for Doherty.

New York, N. Y.
May 8th, 1930

A copy of the above paper has been mailed today by registered mail to Charles M. Thomas, 915 G Street, N.W., Washington, D. C.

Edmund G. Borden,
Attorney for Doherty.

2834 (Stamp) Docket Division Oct 15 1936 U. S. Patent Office.

IN THE UNITED STATES PATENT OFFICE

In re application of
Carbon P. Dubbs
Serial No. 144,979
Filed Jan. 27, 1917
Method and Apparatus for Treating
Petroleum and other Hydrocarbons.

Chicago, Illinois,
October 12, 1936.

Hon. Commissioner of Patents,
Washington, D. C.

Sir:

We hereby grant to Charles M. Thomas, 540 Shoreham Building, Washington, D. C., the power to inspect the files of the above entitled application, and to make copies thereof if he so desires.

Universal Oil Products Company,
By Macauley Carter,
Assistant Secretary.
Assignee.
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2835 Special.

193 Mineral Oils
Processes.

1917

1916

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HCB

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19. Letter Feb. 16, 1924
20. Final Rejection Mar 15 1924
21. Request for Assess, May 10 1930
22. Power to Inspect—Oct. 15/36.

Fig 1

Inventor
Carbon P. Dubbs

Fig. 2.
Fig. 3.
Inventor:
Carlton P. Dubbs

Capacity 5 Chamber Gas Oil. 845° F. Transfer	
% of transfer in vapor state	90%
% of material leaving A5 as vapor	86
Average % Vapor in A5	88%

The average effective temperature in A5 with 845° F. transfer and 740° F. residue outlet is at some intermediate point, but nearer to 740° F. than 845° F. Assuming in this case that the average temperature in bottom of A5 is about 800° F., which is approximately the average of 740 and 845° F., the average effective temperature in A5 would be about 770° F.

Using cracking rates as given by Humphrey Paulus at 770° F.

7.5% per hr. to gasoline (not including gas & P. D. bottoms)

$7.5 + 1.35 + 1.5 = 10.35\%$ to gas & P. D. or

$7.5 + 1.35 = 8.85\%$ /hr. to P. D. in batch still

a la Paulus based on oil originally charged when distilling 50% of charge and making a yield of about 50% P. D. The average quantity of oil in still is then about 0.75 of the oil originally charged. Therefore the cracking rate based on oil actually under treatment at cracking temperature would be

$8.85 + 0.75 = 11.8\%$ per hr. by vol. to P. D. at 770° F.

$11.8 \frac{47.2}{53} = 10.5\%$ per hr. by wt. to P. D. at 770° F.

Time vapors are in the chamber A5 may be estimated on the basis that the velocity of rising varies as $\sqrt{\text{buoyancy}}$ and steam rises through water at about 1 ft. per sec. at atmospheric pressure.

$$\text{Buoyancy of steam} = \frac{26.78}{.0167} = \sqrt{1600} = 40$$

$$\text{Buoyancy of vapors at 770° F. \& 125\#} = \frac{.5}{.0245} = \sqrt{20.4} = 4.47$$

Therefore velocity of rise of vapors is $1 \times \frac{4.47}{40} =$

0.111 ft./sec.

The vapors are in the liquid for a distance of 22 ft. or

$$\frac{22}{0.111 \times 60} = 3.33 \text{ min.}$$

The 3 ft. above the liquid will provide about 0.5 to 0.6 of minute.

Therefore total time vapors in cracking chamber about 4 min. and would crack

to P. D. $10.5 \times \frac{4}{60} \times 88 =$ .616% of C. F.

Cracking in tubes outlet 845° F. 90% vapor about 1.00 % of C. F.

Therefore cracking of liquid in A5 is 14.084% of C. F.

15.7

Cracking per pass $\frac{47.2}{300} = 15.7\%$ by wt. of C. F.

Capacity 5 Chamber Gas Oil 845° F. Transfer.

Time liquid in A5 $= \frac{14.084}{0.12} \times \frac{1}{10.5} = 11.15$ hrs. average effective time.

Total Volume of liquid and vapor in A5 up to point of resid. withdrawal is (for an 8′ x 25′ chamber with withdrawal 3′ down)

$4^2 \times 3.1416 \times 22 = 1105$ cu. ft.

The quantity of combined feed is obtained as follows on basis of volume balance for liquid and vapor in A5.

$$1105 = \text{lbs. C. F./hr.} \left(0.88 \times \frac{3.33}{60} \times 0.5 + 0.12 \times 11.15 \times 0.0245\right)$$

$$= \text{lbs. C. F./hr.} (.0245 + 0.0327)$$

$$\text{lbs. C. F./hr.} = \frac{1105}{.0572} = 19{,}350 = 6{,}450 \text{ lbs. gas oil}$$

$$\frac{6450}{300} \times 24 = 517 \text{ bbls./day of gas oil}$$

Geo. G. Brown.

2840 Capacity 2 Chamber Gas Oil with 810° F. Transfer.

Vapor generation in Transfer 90%
% Vapor out A5 85.5

Average Vapor in A5 87.7%

Cracking per pass $\frac{44.7}{300}$ = 14.9%

Effective temperature averages about 745° F. Cracking rate about $\frac{1}{3}$ x 10.5 = 5.3%/hr. by wt. to P. D.
Cracking in tubes 1.0% of C. F.

Cracking of vapors $5.3 \times \frac{4}{60} \times .877$ .322

Cracking of liquid in A5 13.578

Time liquid in A5 = $\frac{13.578}{.123 \times 5.3}$ = 20.8 hrs.

1105 = #C. F./hr. $(0.877 \times \frac{3.33}{60} \times 0.5 + 0.123 \times 20.8 \times 0.0245)$

#C.F./hr. = $\frac{1105}{.0243+.0626}$ = 12,750 = $\frac{12750}{300}$ = 4250 #g.o.

$42.50 \times \frac{24}{300}$ = 340 bbls./day

Geo. G. Brown.

D.B.S. 1917

(1)

S Unit - Gas Oil

	Charge Gas Oil	P.R.	Resid	To B.S. from K.S. Comb. Feed	To B.S. from K.S. Naphtha	Gas
API	33.5	52.5	17.0	270	240	
Sp. Gr.	7.141	6.364	7.330	7.134	7.574	
I.B.P.	470	100	450	420	410	
5	415	450	520	440	430	
10	509	180	540	490	450	
20	525	220	600	500	472	
30	575	250	640	515	440	
40	563	280	660	530	508	
50	580	300	720	540	490	
60	601	325	745	535	590	
70	625	350	810	535	580	
80	660	375	855	625	595	
90	760	410	910	640	630	
95	730	430		790	690	
E.P.	790	460		800	820	
Sp. Gr.	(60-60)	2.38	2.81	1.5	2.62	2.5
No.	487	575	395	724	562	584
Acid	48.8	272	267	277	540	
Iodine	48.2	580	240	576	541	530
Cloud	48.2	650	300	716	557	513
Viscosity	48.2	596	320	732	562	
K		8.15	12.25	11.25	10.9	
		925	1225	1075	910	
		248	772	324	215	
		1265	430	1.34	170	
		1.28	310	2.67	3.53	
		208	119	2.66	213	195 30
		100	58.0	340	288	188.5 310
		100	47.2	49.7	200	200
				53.2		

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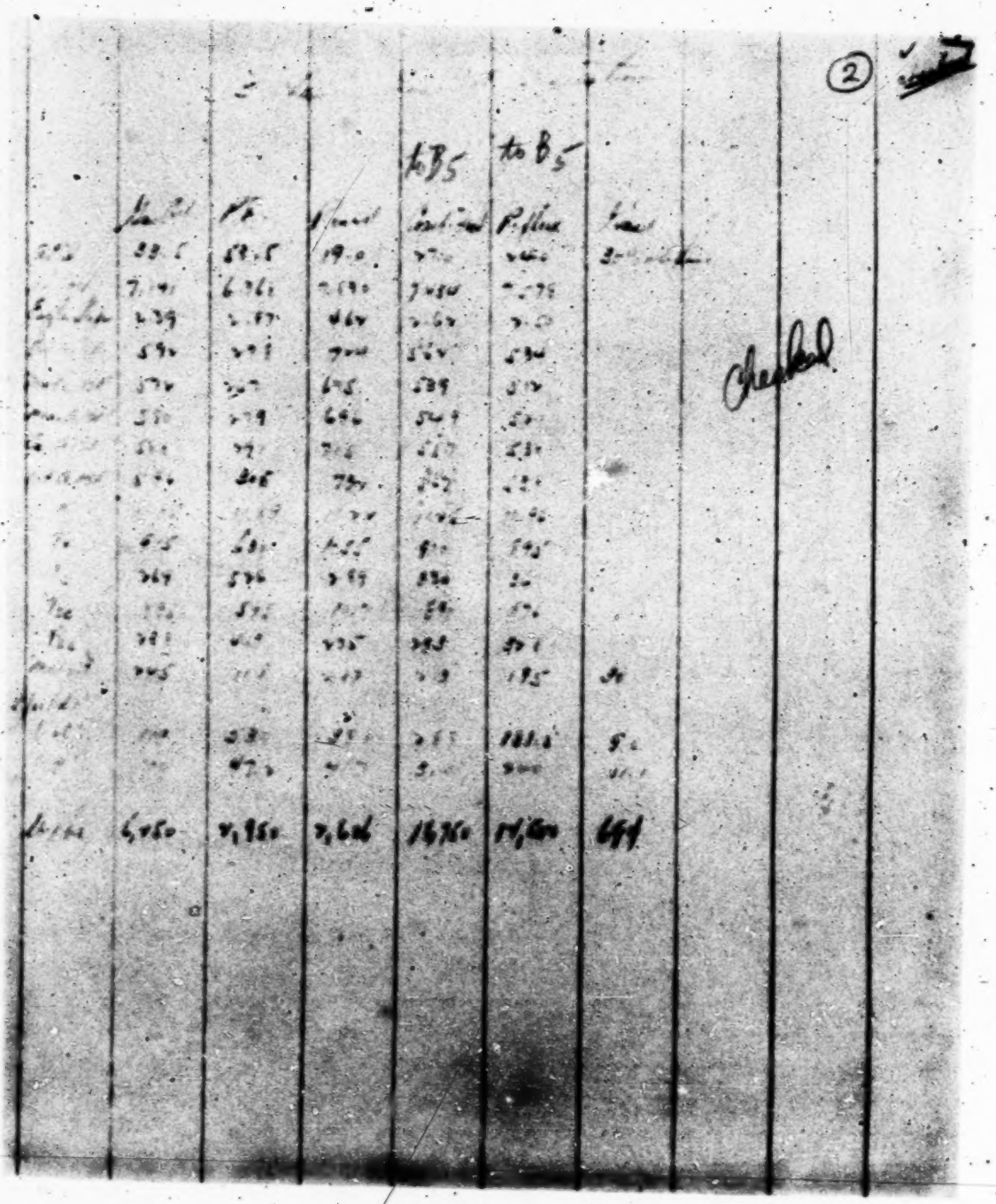
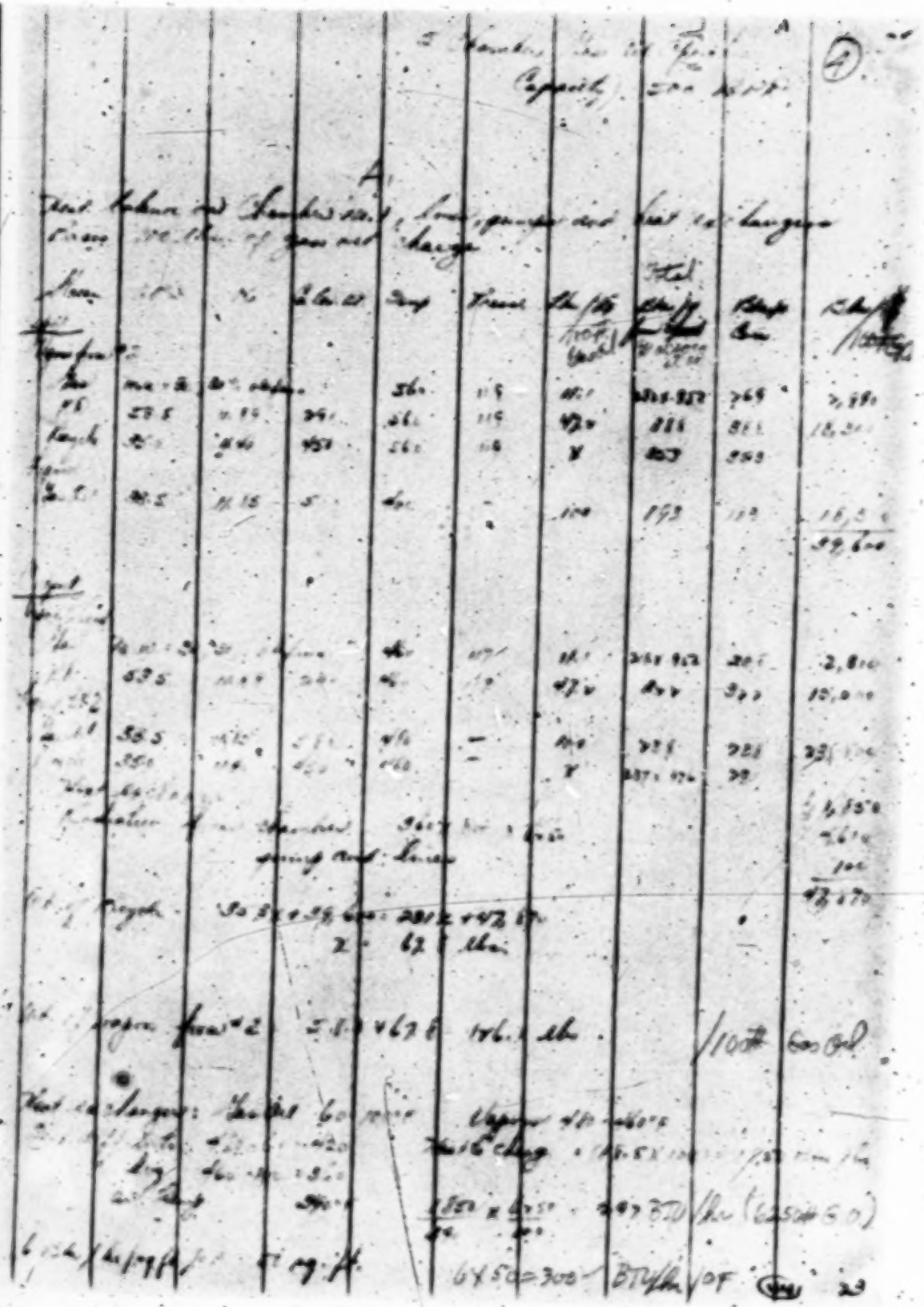


Estimate of Heat of Cracking

Heat of Cracking

Heat of Cracking

Heat of Cracking



1918

Capacity

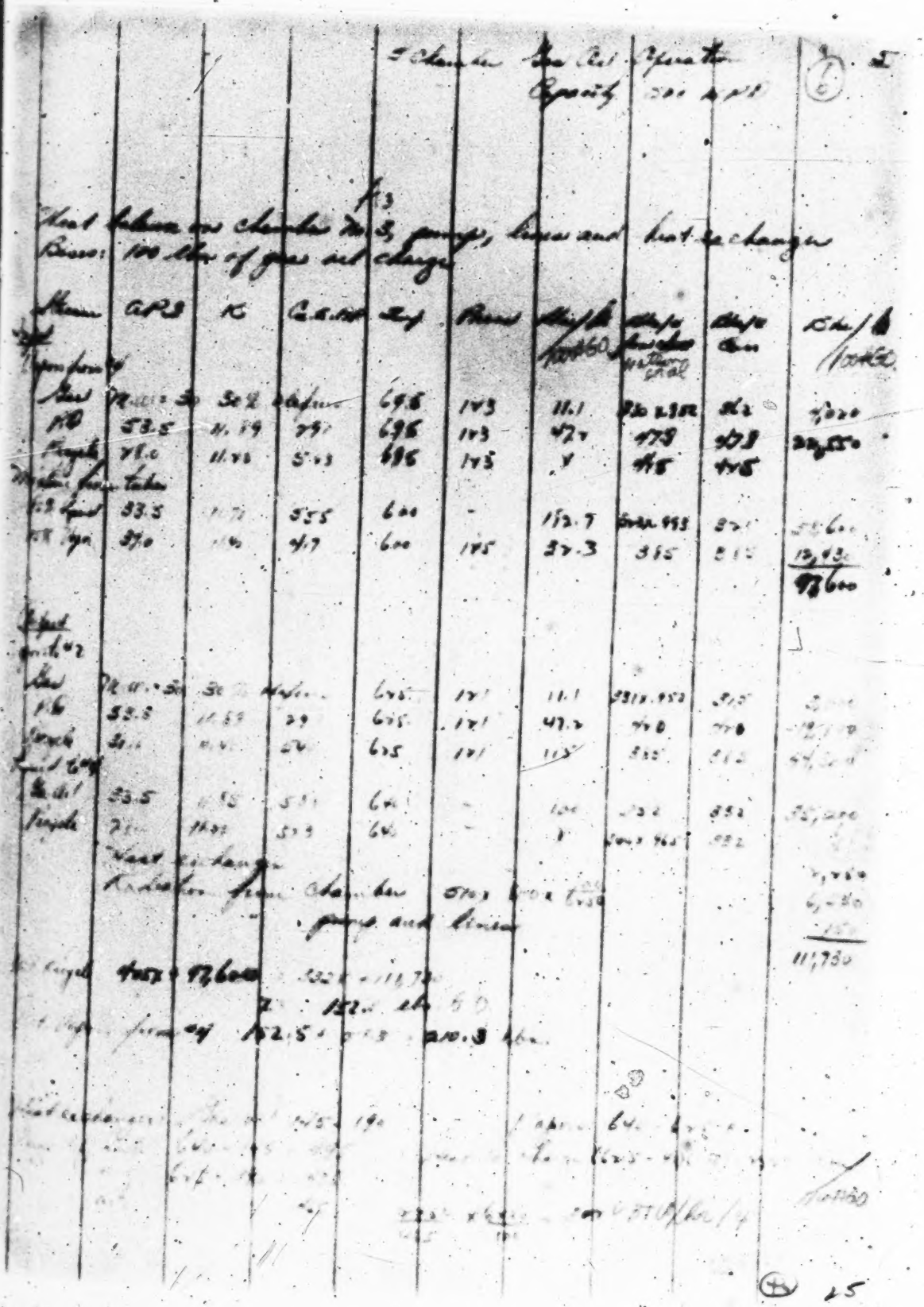
(5)

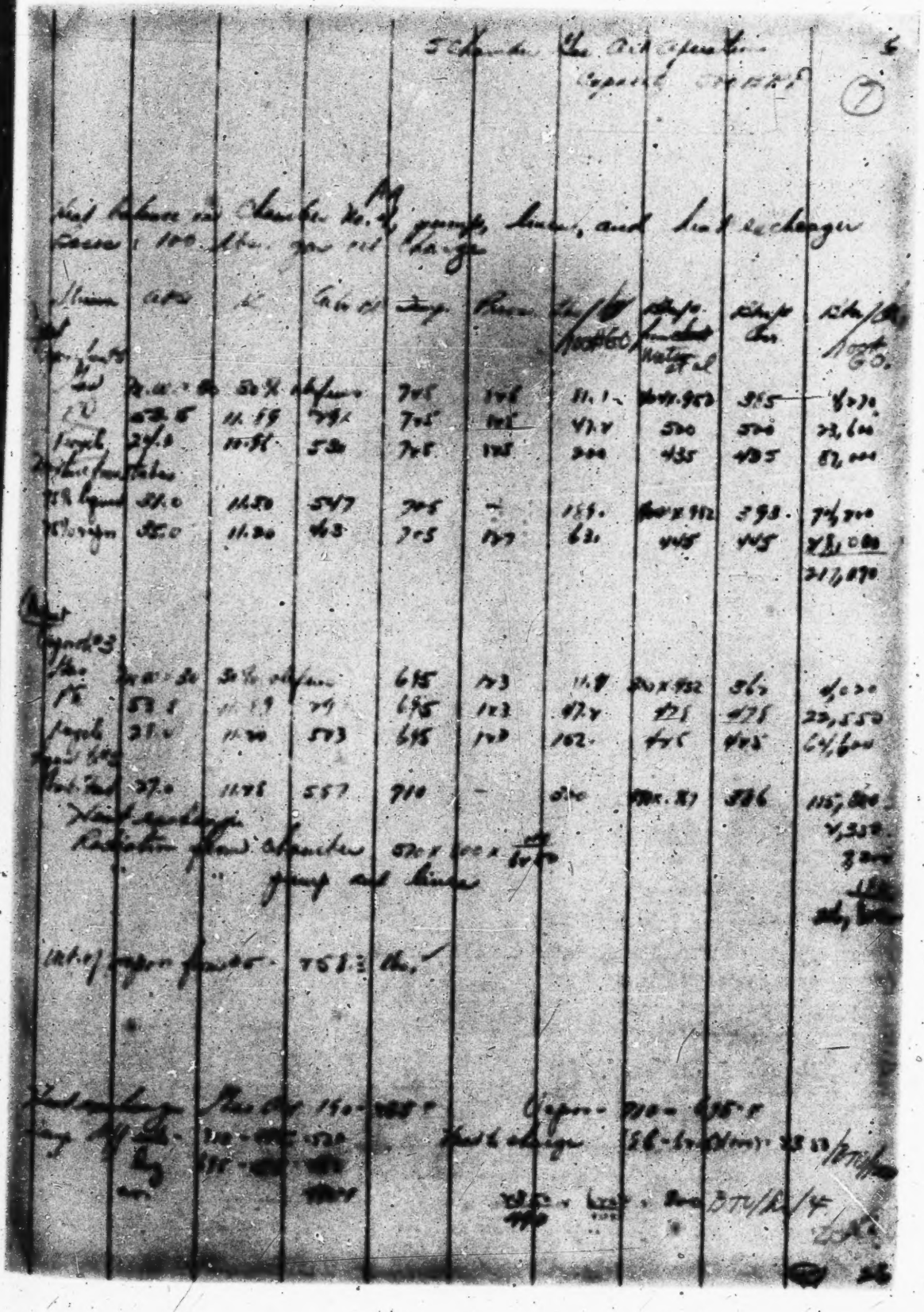
Air

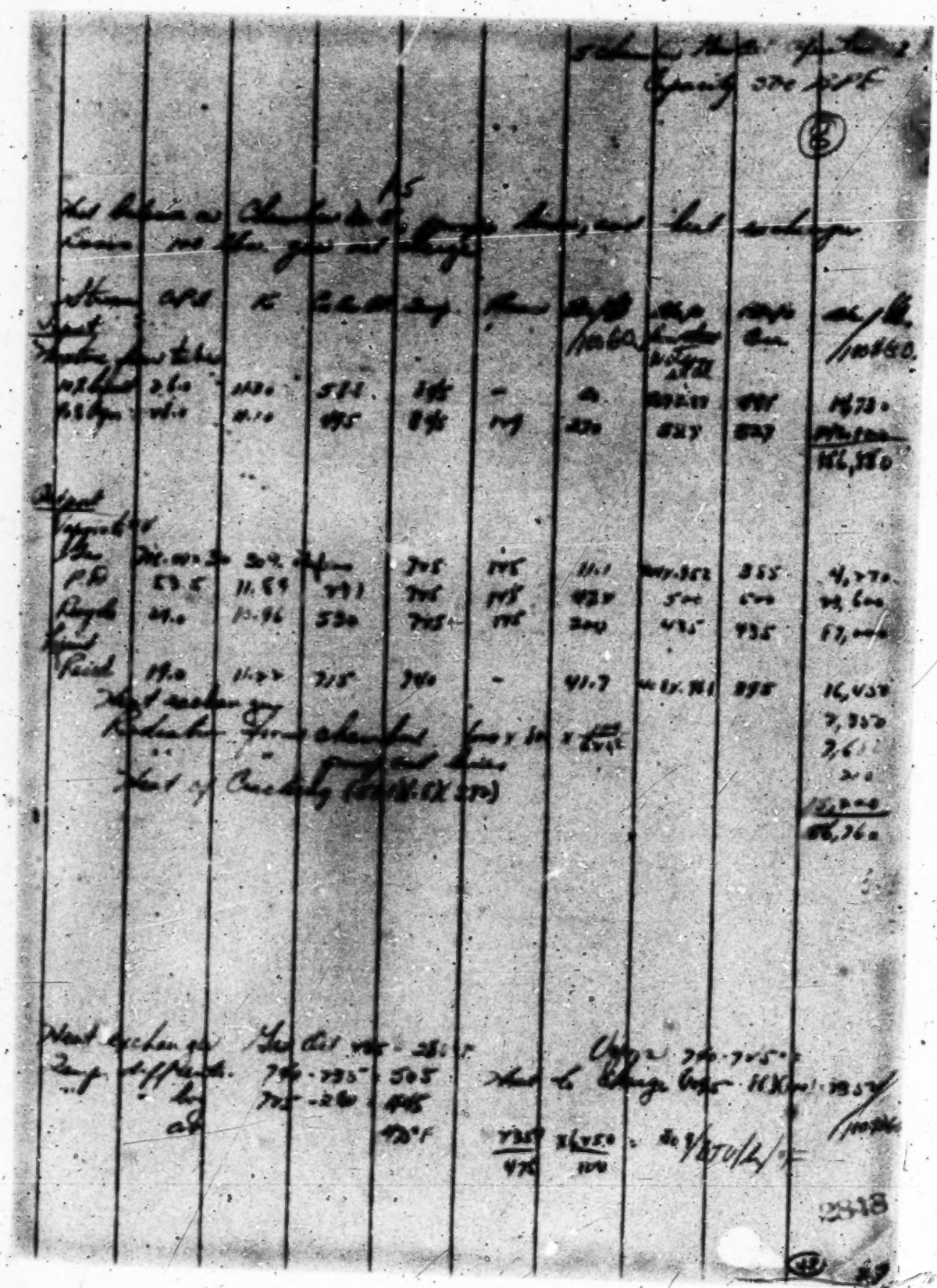
Total

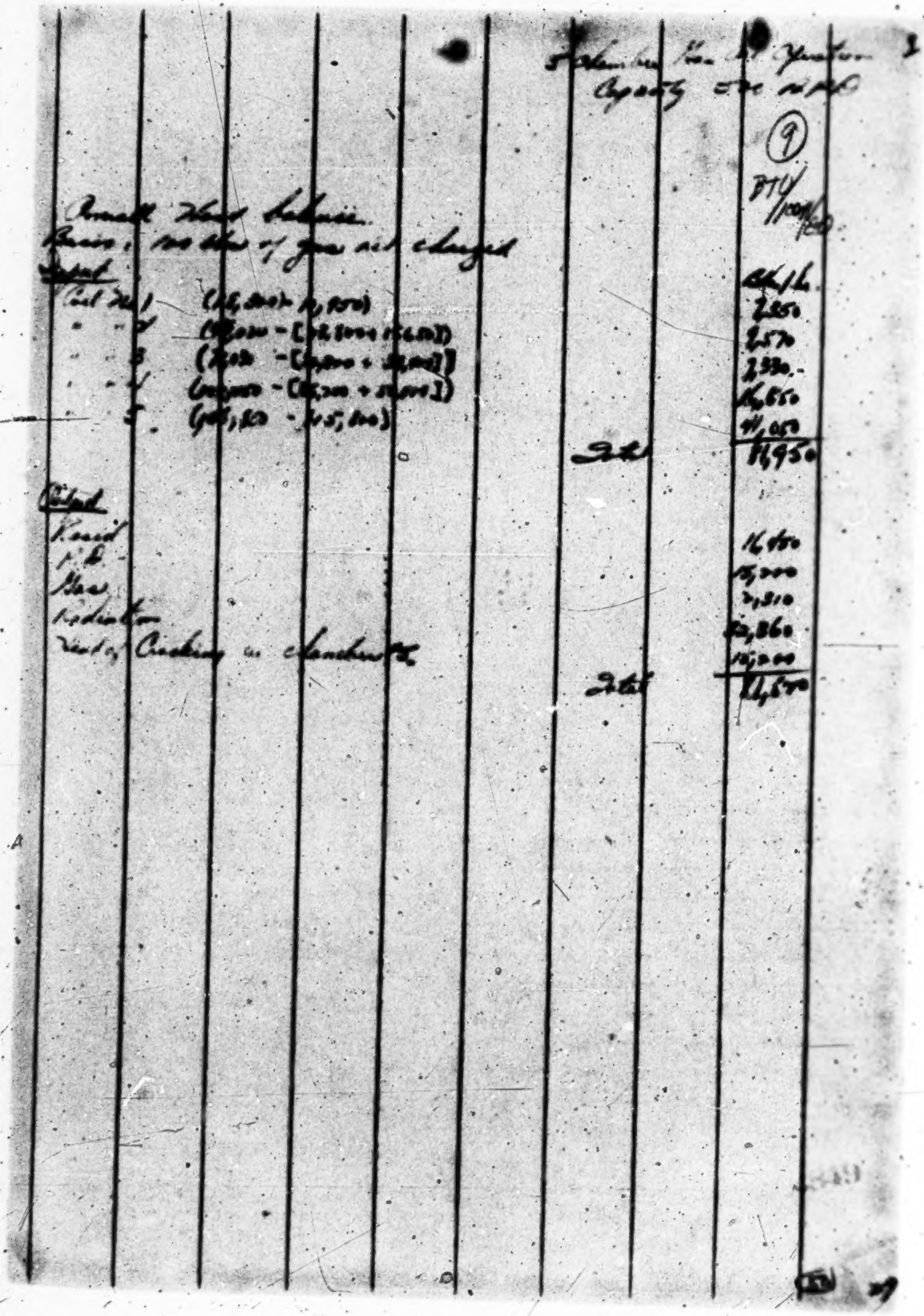
100 lbs 60

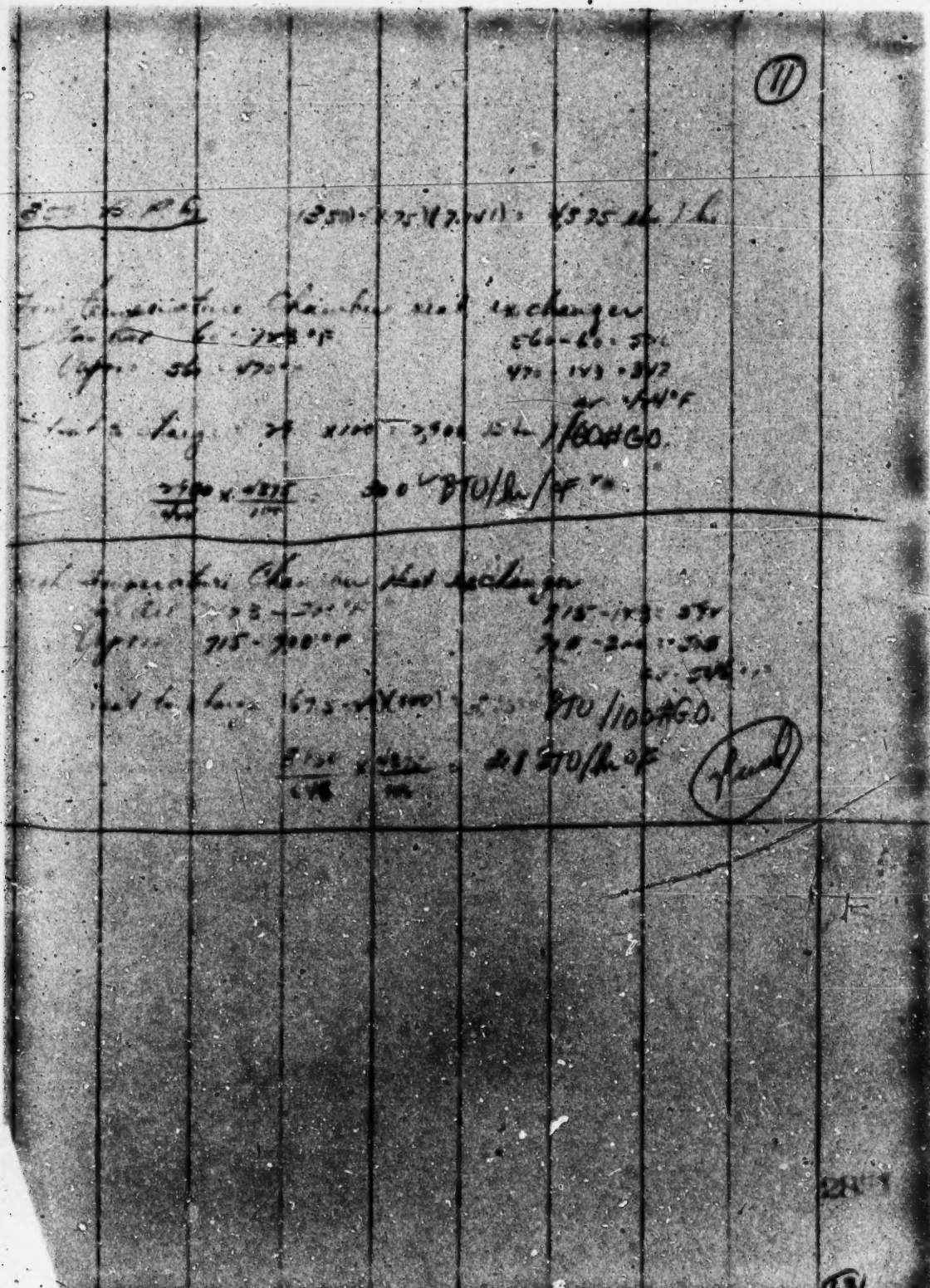
(5) 24











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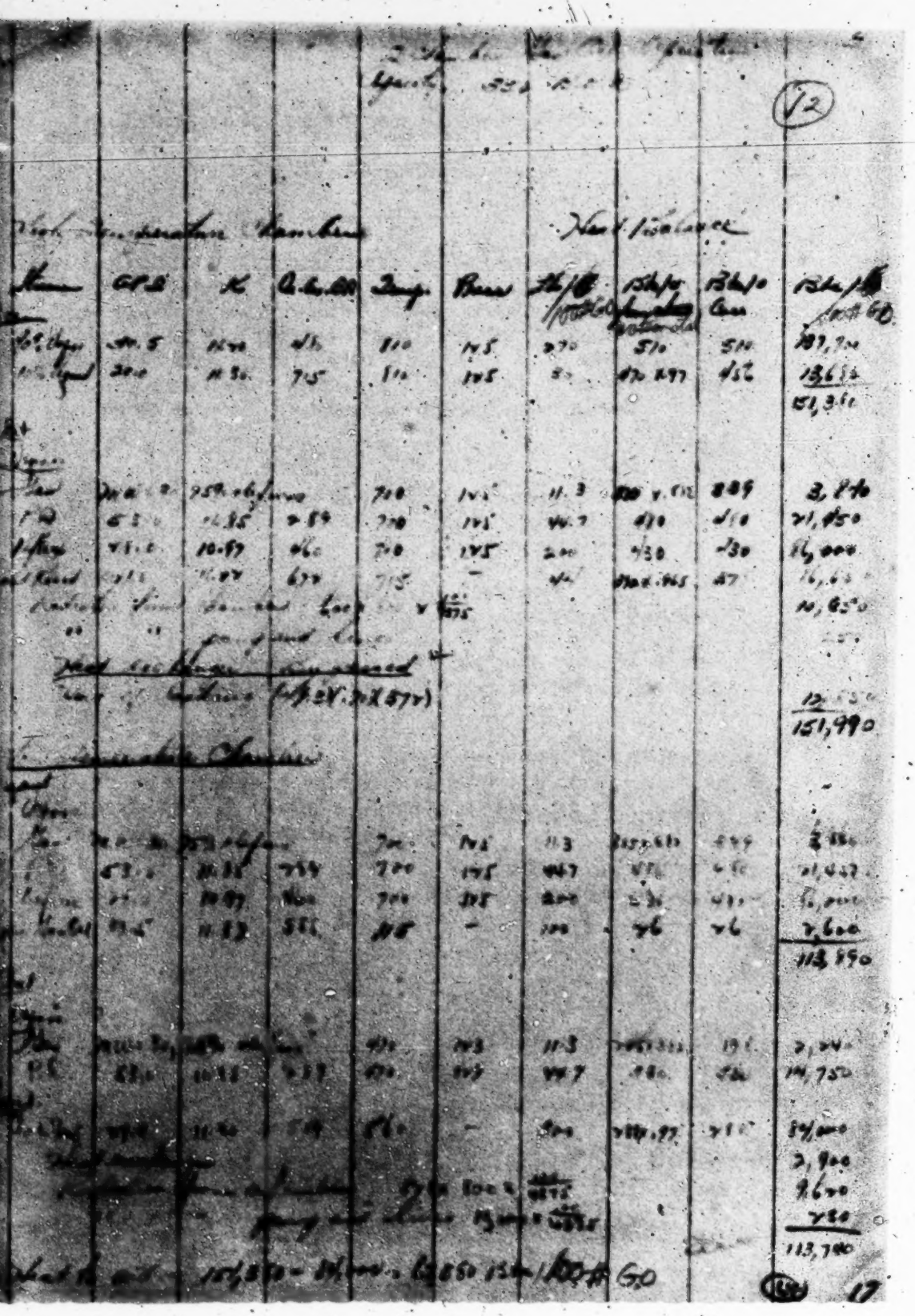

(17)

UNITED STATES CIRCUIT COURT OF APPEALS

For the Seventh Circuit.

I, Kenneth J. Carrick, Clerk of the United States Circuit Court of Appeals for the Seventh Circuit, do hereby certify that the foregoing printed pages contain a true copy of Volume 4 of the printed record, printed under my supervision, which, together with Volumes 1 to 3, and Volumes 5 to 7, inclusive, constitutes the record upon which the following entitled cause was heard and determined:

Cause No. 7912.

Universal Oil Products Company,
Plaintiff-Appellant,

vs.

Globe Oil & Refining Company,
Defendant-Appellee,

as the same remains upon the files and records of the United States Circuit Court of Appeals for the Seventh Circuit.

In Testimony Whereof I hereunto subscribe my name and affix the seal of said United States Circuit Court of Appeals for the Seventh Circuit, at the City of Chicago, this 18th day of August, A. D. 1943.

Kenneth J. Carrick,
(Seal) *Clerk of the United States Circuit Court of Appeals for the Seventh Circuit.*